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ABSTRACT

This curriculum guide is designed for group instruction of secondary agricultural education students enrolled in one or two semester-long courses in elements of farm and building layout. The guide presents units of study in the following areas: (1) sketching and drawing equipment, (2) gothic lettering, (3) layout of a standard sheet, (4) job orientation, (5) orthographic projection, (6) oblique drawings, (7) isometric pictorial drawing, (8) top map, (9) auxiliary view, (10) materials, (11) foundations, (12) designing farm buildings. Each of the twelve units of instruction follows a typical format: terminal objective, specific objectives, suggested instructor and student activities, instructional materials, information sheet, transparency masters, assignments sheets, and a student test. (LRA)

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ED181259

AGRICULTURE EDUCATION

2-13-80

ELEMENTS OF FARM AND BUILDING

FUTURE FARMERS OF AMERICA
VOCATIONAL
FFA
AGRICULTURE

LAYOUT

2

CE023771

U.S. DEPARTMENT OF HEALTH,
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PREFACE

This curriculum guide is a suggested method of group instruction for students enrolled in one or two semester-long courses in Agriculture Education.

This material is intended to cover those items which a student will most likely encounter when employed in this given area of agriculture.

Individualized instructional material should be supplemented to this curriculum guide to meet individual and local needs.

This curriculum guide contained herein was performed pursuant to a contract with the Exemplary Section, Division of Vocational, Technical and Adult Education, Arkansas Department of Education.

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The content of this publication was prepared and reviewed by:

AGRICULTURE EDUCATION STAFF
STUTTGART PUBLIC SCHOOLS

Ned Moseley	Superintendent
J.E. Lawrence	Principal
Joe C. Williams	Principal
John Gentry	Soybean and Rice Production
Glenn Aubrey	Soybean and Rice Production
Vincent Lum	Soybean and Rice Production
Anthony Ashlock	Farm Machinery
Roger Clark	Horticulture
James Rodgers	Horticulture
James Branson	Elements of Farm and Building Layout
Greg Goss	Agriculture Structures
Harlan Peacock	Agriculture Structures
John C. Davis	Agriculture Structures
Richard Gray	Agricultural Metal Working
Wayne Smith	Agricultural Metal Working
James Phillips	Agricultural Metal Working

INSTRUCTORS OF VOCATIONAL AGRICULTURE

Dick Pirkey
Danny Blalock
Billy Watkins
James Gambill
Johnny Neel
Martin Gosset
Dale Thompson
Tom Walker
Lee Griffith
Jack Warnock
Ralph A. Cheshier
Ron Highfill
Wallace Wortham
Jackie Brown
Jack McCord
David Nordin

Garlen T. Willis
Thomas G. Baker
Jim Penn
Troy W. Buck
James Morris
Jimmy Stotts
Thomas Craig
Melvin Daniel
Tommie L. Brown
Jesse F. Bush
Reuben McClelland
Gary Hines
Glen Tice
Terry Waits
David Montgomery
J.R. Buckner

Jerry S. Speir
Howard Easterling
Phillip Rows
James Neely
Harold Ramsey
Emmit Biswell
David Holcombe
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William O. McCoy
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David Marcantel
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John Turner
Mickey Sweeney
Jack Watkins
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Gail Thrower
James Boyd
Floyd Gray
Malcolm Patterson
Skip Emmett
Tommie Hill

STATE DEPARTMENT OF EDUCATION VOCATIONAL STAFF

James Dasher
Robert Crawley
Unice Latimer
Bob Verboon
Travis Hopper
Don Harlan
Marion Fletcher
Linda Beene
Peggy Patrick

Other contributors were;

Ciba Geigy Corporation, Greensboro, North Carolina

Alabama State Department of Education, Auburn, Alabama

New Mexico State Department of Education, Santa Fe, New Mexico

State Department of Vocational and Technical Education, Curriculum and Instructional Materials Center, Stillwater, Oklahoma

John Deere and Company, Moline, Illinois

American Association for Vocational Instructional Materials, Room 120, Engineering Center, Athens, Georgia

Hobar Publications, St. Paul, Minnesota

McGraw Hill Book Company, New York, New York

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SECTION A

UNIT I

SKETCHING AND DRAWING EQUIPMENT

SKETCHING AND DRAWING EQUIPMENT

TERMINAL OBJECTIVE

After completion of this unit, the student will be able to identify sketching and drawing equipment. This knowledge will be evidenced through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Match terms associated with sketching and drawing tools with correct definition.

II. Identify drafting equipment.

III. Identify erasers.

IV. Identify pencils, sharpeners and lead pointers.

V. Distinguish between T-square and triangle.

VI. Distinguish between instrument set and templates.

VII. Name and draw ten different types of lines.

VIII. Name three different types of dividers.

IX. Name three types of compasses.

X. Demonstrate the ability to:

   A. Use compass and dividers.

   B. Use T-square and triangle.

   C. Name and draw ten different types of drawing lines.

SKETCHING AND DRAWING EQUIPMENT

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide students with objective sheet.
- B. Provide students with information and assignment sheets.
- C. Make transparencies.
- D. Discuss terminal and specific objectives.
- E. Discuss information and assignment sheets.
- F. Direct students through the different learning parts for each specific objective.
- G. Discuss and show an example of using a standard format in writing a unit on sketching and drawing equipment.
- H. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheets.
- C. Complete each assignment sheet.
- D. Make sure you are able to perform according to the type of performance called for by each specific objective.
- E. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet

C. Transparency masters

  1. TM 1 - Drafting Equipment
  2. TM 2 - Erasers and Accessories
  3. TM 3 - Pencils, Sharpeners and Lead Pointers
  4. TM 4 - T Square and Triangles
  5. TM 5 - Instrument Set and Templates
  6. TM 6 - Alphabet of Lines
  7. TM 7 - Dividers
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  9. TM 9 - Using Dividers and Compasses

D. Assignment sheet

  1. Assignment sheet #1 - Identify Drafting Equipment
  2. Assignment sheet #2 - Draw and Name Ten Different Types of Drawing Lines
  3. Assignment sheet #3 - After Studying Transparency Masters 1-9:
     a. Draw a 4½ inch circle with a large bow compass.
     b. Draw a 2½ inch circle with a small bow compass.
     c. Check the work on both of the circles that have been just completed with a set of dividers.
  4. Assignment sheet #4 - After Studying TM 1-4:
     a. Draw a box in the center of this sheet of paper with a vertical height of 7 inches and a horizontal length of 4½ inches.

E. Answers to assignment sheets

F. Test

G. Answers to test

II. References:

A. Biere, Drafting Equipment, St. Louis, Missouri, Milliken Publishing Co.

B. Walker, J.R. Exploring Drafting, South Holland, Illinois, The Goodheart Wilcox Co. Inc.

C. Hornung, W.J. Architectural Drafting, Englewood Cliff, New Jersey, Prentice-Hall, Inc.

D. Giesecke, Mitchell, Spencer and Hill, Technical Drafting, New York, Macmillan Publishing Co. Inc.

SKETCHING AND DRAWING EQUIPMENT

INFORMATION SHEET

I. Terms and definitions:

A. DRAFTING EQUIPMENT - Equipment used in percision drawings.

B. ERASERS - Used in the removing of pencil and pen drawing errors.

C. PENCILS - A slender cylinder or strip of black lead, colored chalk, etc., usually incased in wood for writing or drawing.

D. SHARPENER - Used to point the end of a pencil. This type is normally mechanical.

E. LEAD POINTER - Layers of sandpaper mounted on wood used for pointing or sharpening lead for writing or drawing.

F. T-SQUARE - Horizontal lines are drawn with the T-square. It also supports triangles when being used to draw vertical and inclined lines.

G. TRIANGLE - A figure (formerly the area, now commonly the three bounding lines) formed by three lines intersected by twos in three points, and so forming three angles or sets of angles.

H. INSTRUMENT SET - Tools used in the drawing and inking of geometric designs. Also used in measuring and finding unknown points.

I. TEMPLATES - A gauge, pattern or mold, commonly a thin plastic used as a guide to the form of the work.

J. LINE - A mark of division or outline as on a drawing.

K. DIVIDERS - An instrument for dividing lines.

L. COMPASS - A tool used to draw circles, arches and geometric designs.

II. Drafting Equipment - (Refer to TM 1)

A. A T-square is used to make horizontal lines.

INFORMATION SHEET

B. Drawing Boards are used as the surface on which drawings are made.

C. French Curves are used to draw curved lines that are not exactly circular.

D. Soft Pink Erasers are used to erase lightly marked lines.

E. Protractors are used to determine the number of degrees in an angle.

F. A Firm Red Eraser should be used for lines that are well embedded in paper.

G. Sandpaper Pads are used to point pencils.

H. 45-45-90 Degree Triangles are used to draw vertical and incline lines of 45 degrees and 90 degrees primarily.

I. Drafting Pencils are used to construct lines or draw lines.

J. Erasing Shields are used to prevent the erasing of desired lines.

K. A Pencil Pointer is used to sharpen pencils.

L. 30-60-90 Degree Triangles are used to draw vertical and incline lines of 30 degrees, 60 degrees and 90 degrees primarily.

M. Drafting Tape holds paper on the drafting board.

N. Scale Triangular is used to measure from one point to another. Most of the time we will be using an Architect's Scale.

III. Erasers (Refer to TM 2)

A. Firm Red erasers are used to erase lines that are deeply embedded usually with a hard lead pencil.

B. Soft Green erasers are used to erase pencil marks that are mediumly embedded into paper.

C. Soft Pink erasers are used to remove pencil marks that are not deeply embedded into paper.

INFORMATION SHEET

D. Art Gum is used to remove lines that are put down lightly.

E. Vinylite Vellum is used to remove very light lines drawn with a pencil.

F. A Dry Cleaning Pad is used in cleaning drawings of excess dirt or pencil lead.

G. Eraser Shields are used to prevent the erasing of desired lines.

H. Electric Erasers are used to save energy.

I. Dusting Brushes are used to clean away erasure crumbs.

IV. Pencils, Sharpeners and Lead Pointers:

A. Pencils

1. Pencils appear in several forms. (Refer to TM 3)

   a. Hard - 9H - 8H - 7H - 6H - 5H - 4H

   b. Medium - 3H - 2H - H - F - HB - B

   c. Soft - 2B - 3B - 4B - 5B - 6B - 7B

2. A, B and C discussed above refer to the hardness of the lead.

3. Pencils are used to mark lines in a drawing.

B. Sharpeners - Used to make points on the writing ends of the pencil.

1. Most sharpeners are like those found in a school classroom.

2. There are other types of sharpeners but the most widely used are similar to the one shown on TM 3.

C. Lead Pointers - Used to put a fine point on the writing end of a pencil.

INFORMATION SHEET

V. T-Square and Triangle

A. T-square - Used to draw horizontal lines and to support triangles in the drawing of vertical and inclined lines.

Example: Refer to top drawing on TM 4.

B. Triangles - Used to draw vertical and inclined lines as they rest on the T-square. Triangles usually appear in 30 degrees, 60 degrees, 90 degrees or 45 degrees, 45 degrees and 90 degree forms.

Example: Refer to middle drawing on TM 4.

VI. Instrument Set and Templates

A. Instrument Set - Tools used in the drawing or inking of geometric design and can be used to find unknown points in some cases.

Example: Bottom drawing on TM 5.

B. Templates - Used as a gauge, pattern or mold, commonly a thin plastic. A template has precut and measured wholes that are accurate to a specific scale. The scales will vary as to need.

Example: Top drawing on TM 5.

VII. Ten Different Types of Lines: Refer to TM 1-TM 6.

A. Visible lines are used to outline the visible object being drawn.

B. Cutting Plane lines are used to indicate where a section view will be taken.

C. Border lines are used in making the outside line that gives drawings the picture effect.

D. Construction lines are drawn very lightly. They are used to block in drawings and as guide lines for lettering.

E. Dimension lines are usually capped at each end with arrowheads and is placed between two extension lines. The measurement should be placed toward the center of the extension line between the arrowheads.

INFORMATION SHEET

F. Extension lines extend the dimension beyond the outline to the view so that the dimension can be read easily.

G. Hidden lines are used to show the hidden failures of the object.

H. Center lines are used to indicate the center of symmetrical objects.

I. Section lines are used when drawing the inside features of the object. They indicate material cut by the cutting plane line and also indicate the general classifications of the material.

J. Phantom lines are used to indicate alternate positions of moving parts and for repeated detail like threads and springs.

VIII. Dividers are used to subdivide and measure. There are three basic types.

A. Wheel

B. Fraction

C. Proportional

Example: TM 1-7

IX. Compasses

A. In this case we will be working with three basic types of compasses.

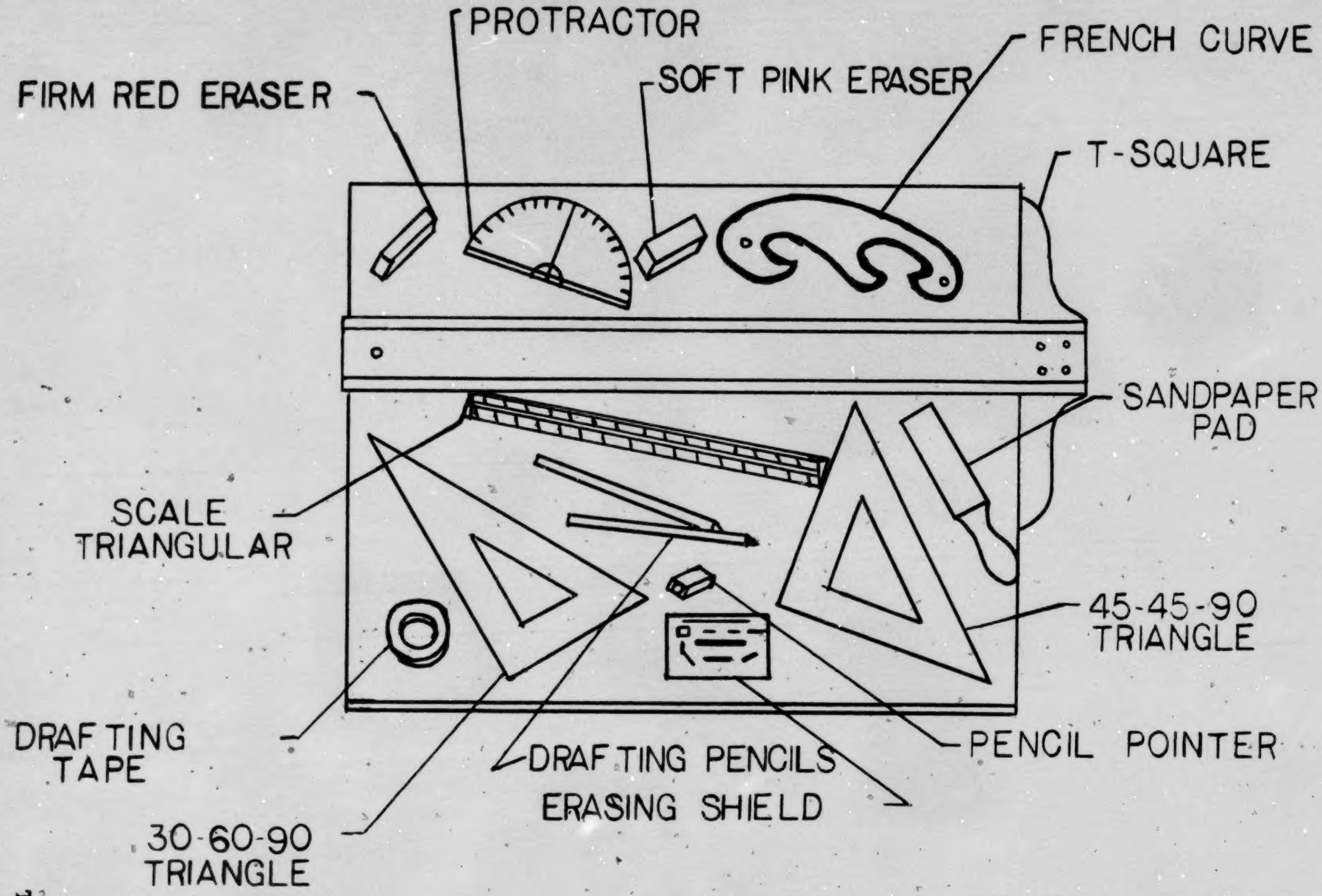
1. Small Bow - Adjust both ways. 3" diameter.

2. Large Bow - Adjust both ways. 6" diameter.

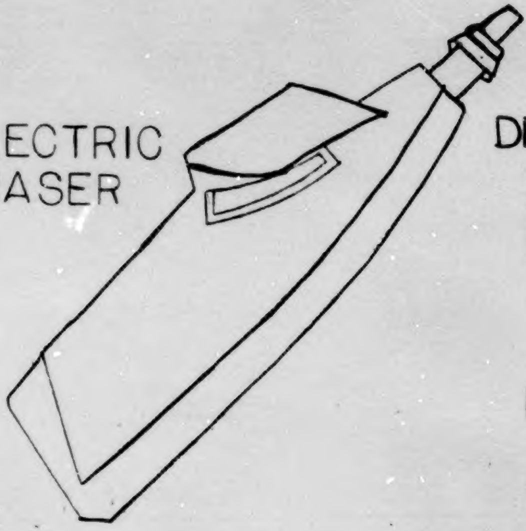
3. Drop Spring Bow - Adjust only one way.

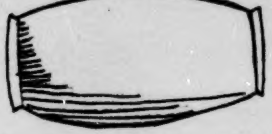
NOTE: Inking attachment can be bought at the same time or separate with most compasses. Refer to TM 1-8.

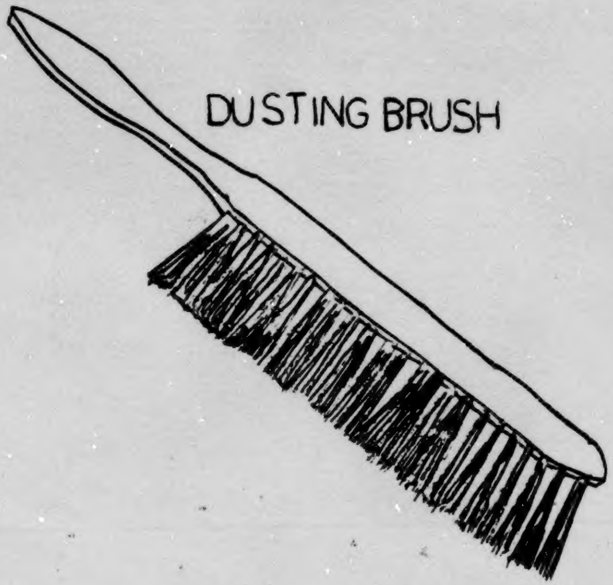
DRAFTING EQUIPMENT

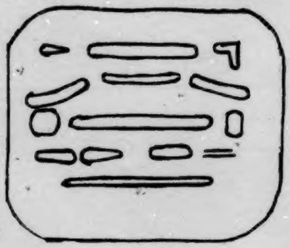

PROTRACTOR
FRENCH CURVE
FIRM RED ERASER
SOFT PINK ERASER
T-SQUARE
SANDPAPER PAD
SCALE TRIANGULAR
45-45-90 TRIANGLE
DRAFTING TAPE
PENCIL POINTER
DRAFTING PENCILS
ERASING SHIELD
30-60-90 TRIANGLE

ERASERS AND ACC.


ELECTRIC ERASER


DRYCLEANING PAD


DUSTING BRUSH


ERASER SHIELD

FIRM RED

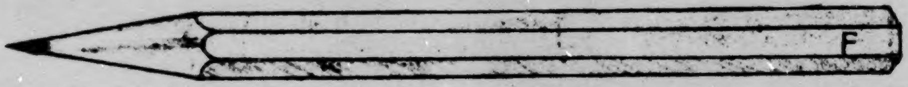
SOFT GREEN

SOFT PINK

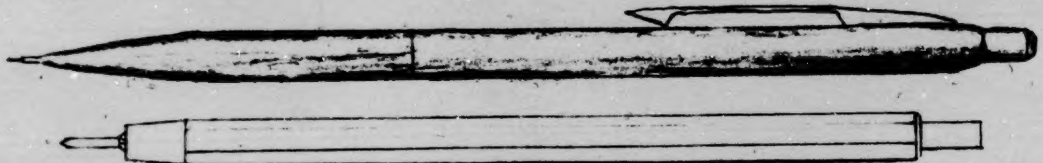
ART GUM

VINYLITE VELLUM

PENCILS, SHARPENERS AND LEAD POINTERS



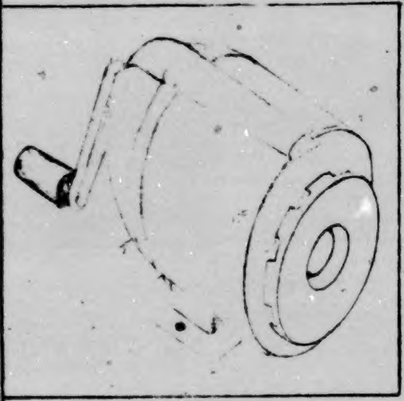
WOOD PENCILS



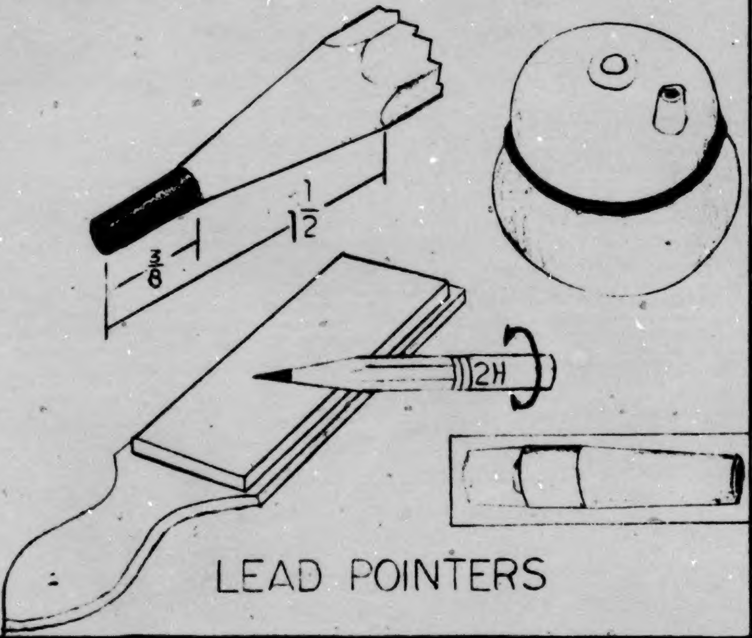
MECHANICAL PENCILS

LEAD GRADES

← HARD	MEDIUM	SOFT →
9H-8H-7H-6H-5H-4H	3H-2H-H-F-HB-B	2B-3B-4B-5B-6B-7B

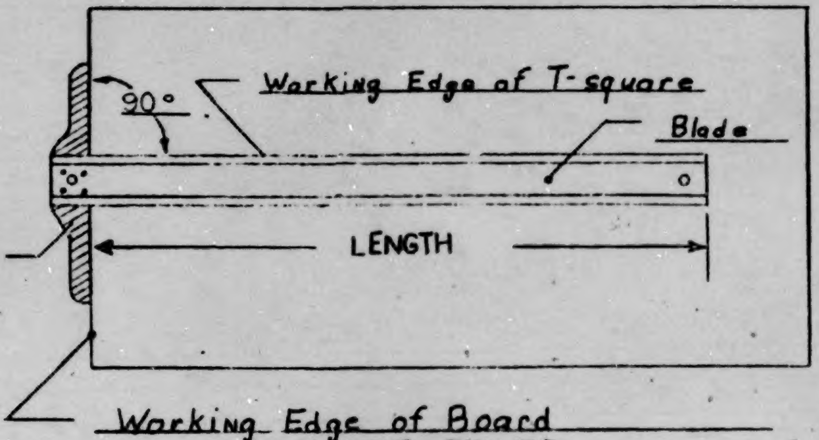


DRAFTMAN'S PENCIL SHARPENER

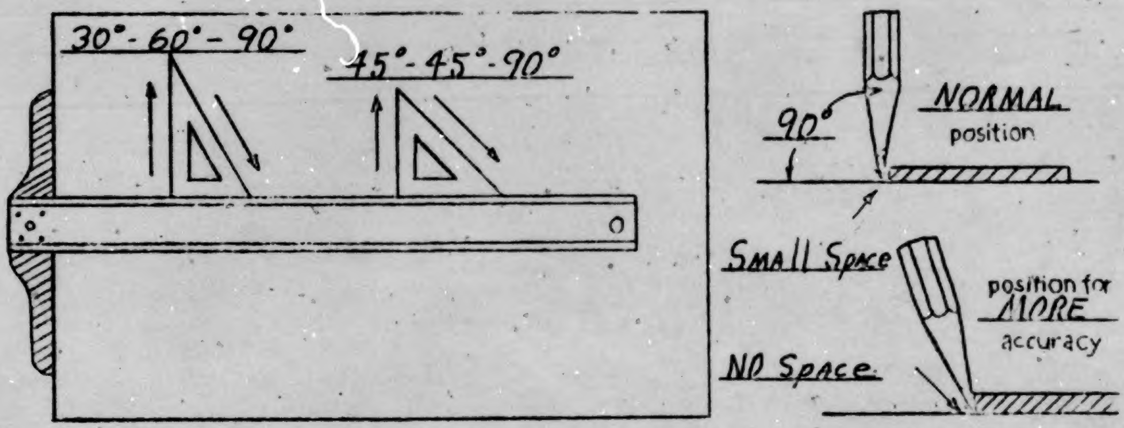


LEAD POINTERS

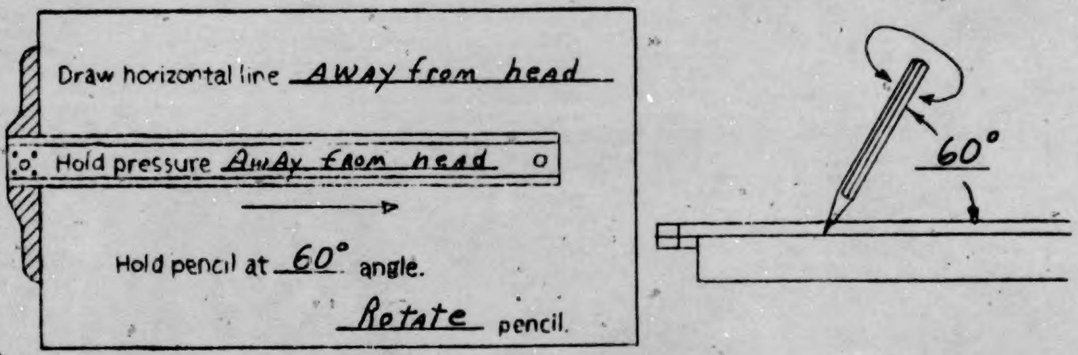
T-SQUARE AND TRIANGLES


90°
Working Edge of T-square
Blade
LENGTH
Working Edge of Board

T-SQUARE- BOARD


30°-60°-90°
45°-45°-90°
90°
NORMAL
position
Small Space
position for
MORE
accuracy
NO Space

DRAWING VERTICAL AND INCLINED LINES



Draw horizontal line AWAY from head

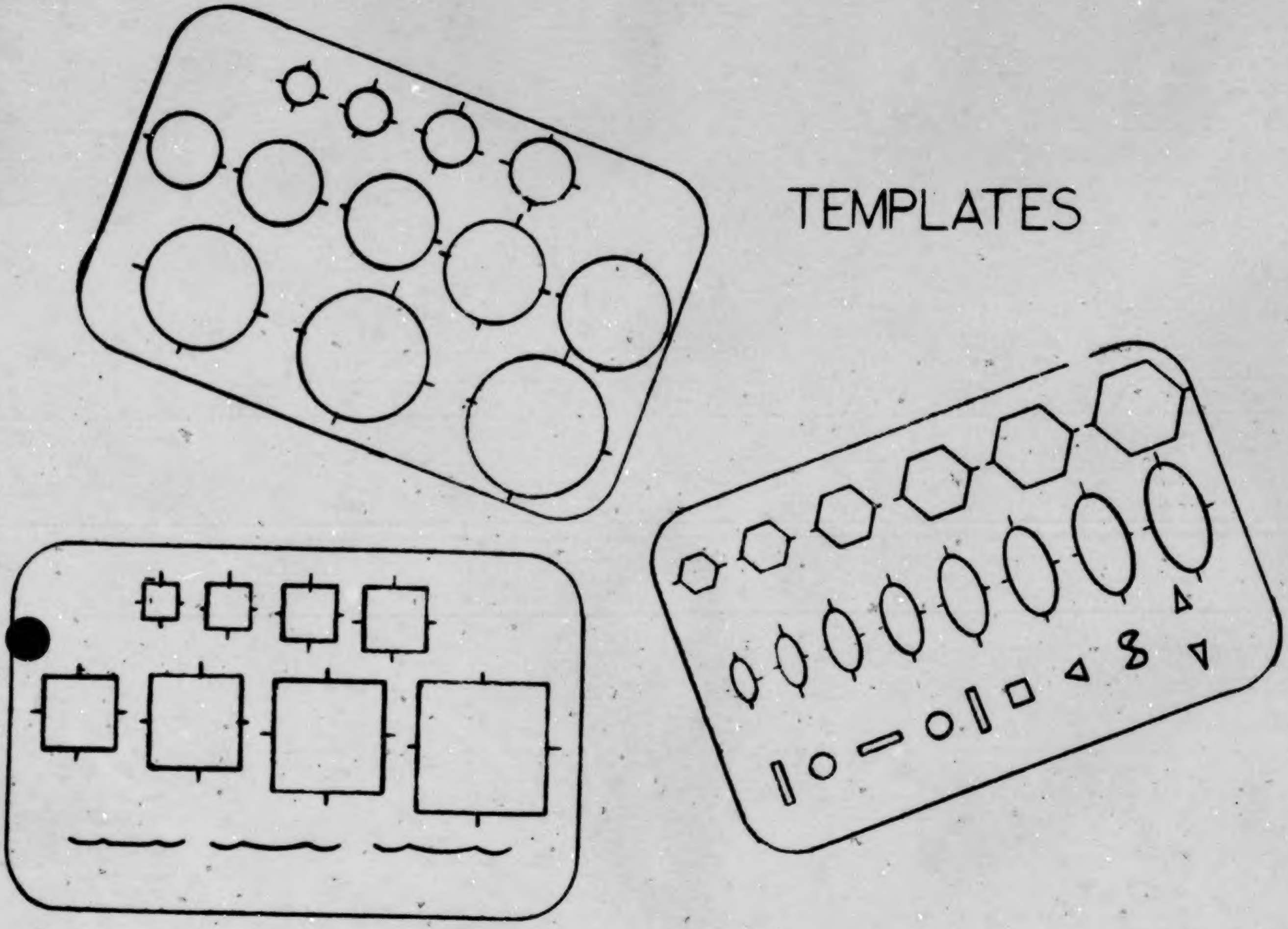
Hold pressure AWAY FROM head

Hold pencil at 60° angle.

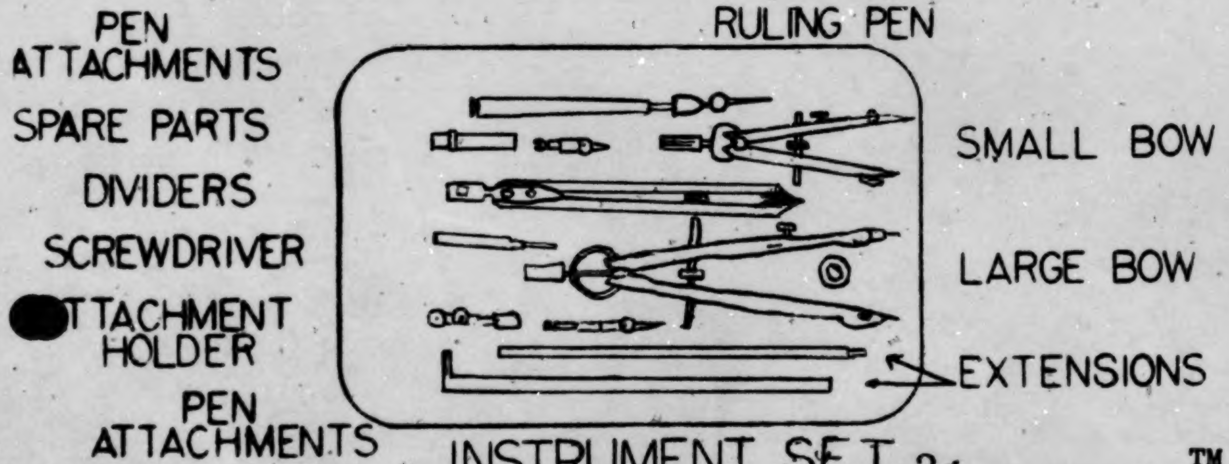
Rotate pencil.

DRAWING HORIZONTAL LINES

INSTRUMENT SET AND TEMPLATES

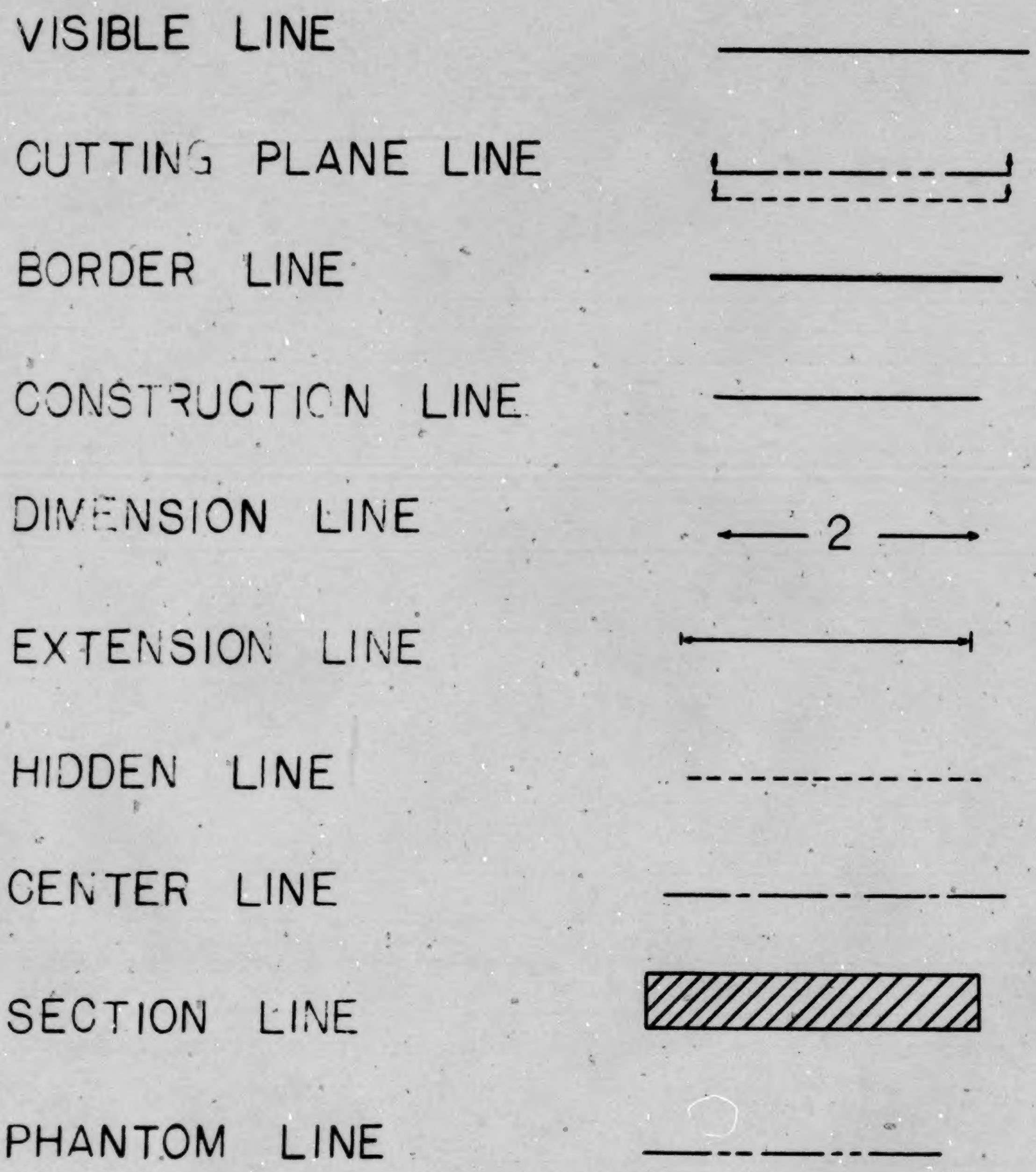


TEMPLATES

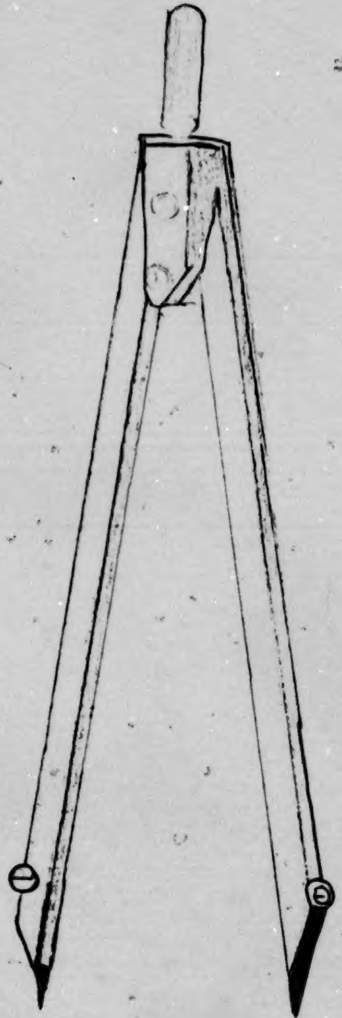

PEN ATTACHMENTS
SPARE PARTS
DIVIDERS
SCREWDRIVER
ATTACHMENT HOLDER
PEN ATTACHMENTS
RULING PEN
SMALL BOW
LARGE BOW
EXTENSIONS

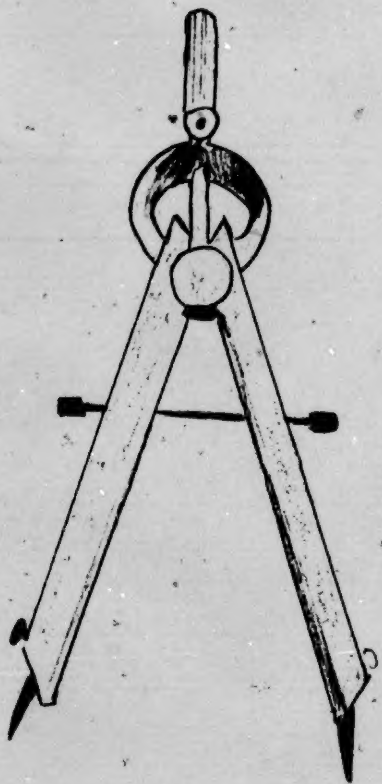
INSTRUMENT SET

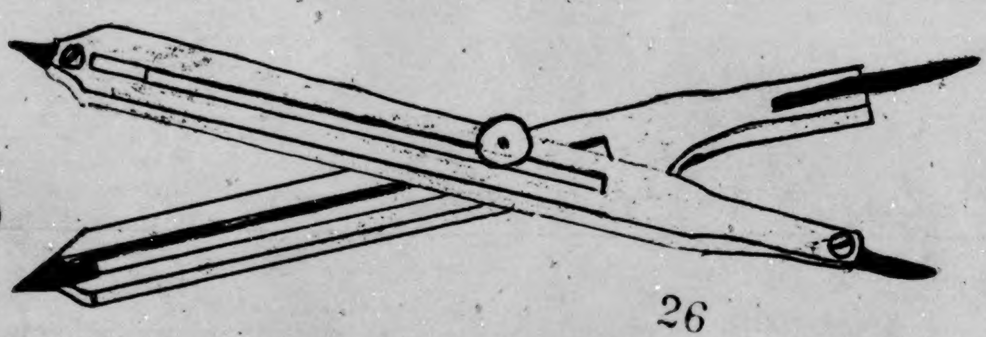
ALPHABET OF LINES


VISIBLE LINE
CUTTING PLANE LINE
BORDER LINE
CONSTRUCTION LINE
DIMENSION LINE
2
EXTENSION LINE
HIDDEN LINE
CENTER LINE
SECTION LINE
PHANTOM LINE

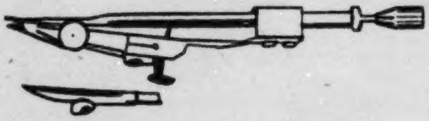
DIVIDERS



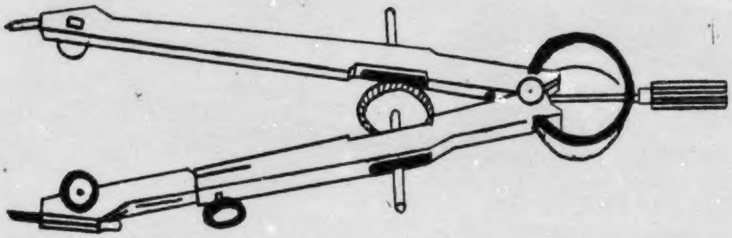




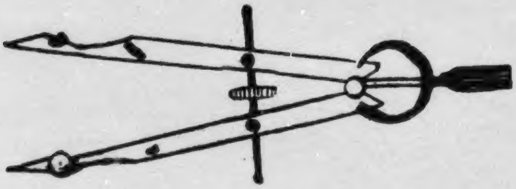
COMPASSES



DROP-SPRING BOW

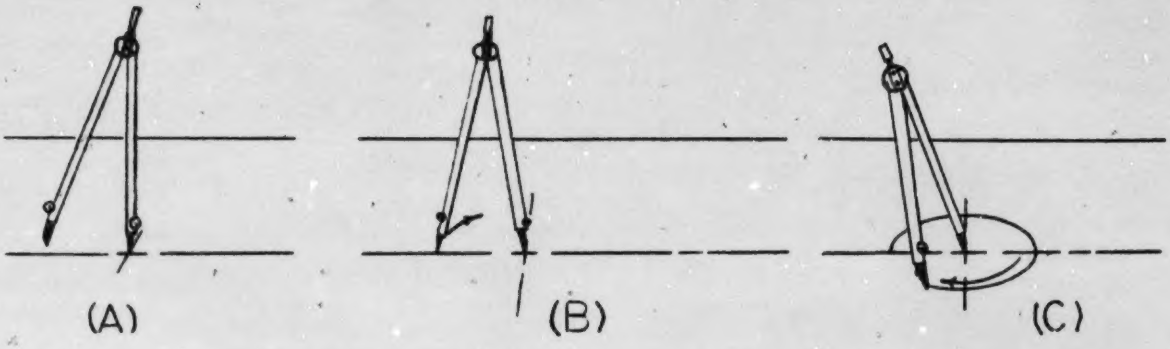


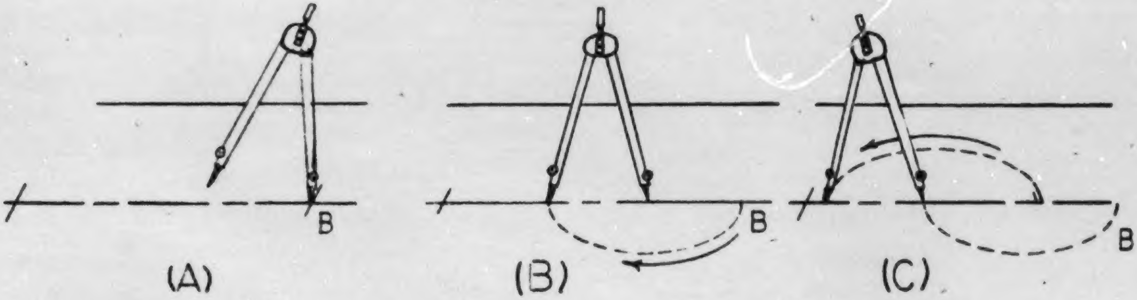
LARGE BOW

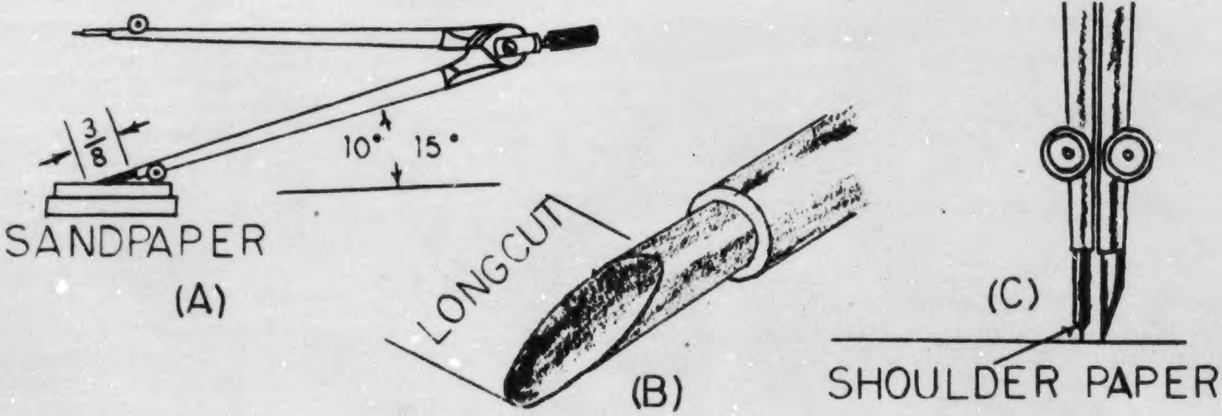


SMALL BOW

USING DIVIDERS AND COMPASSES





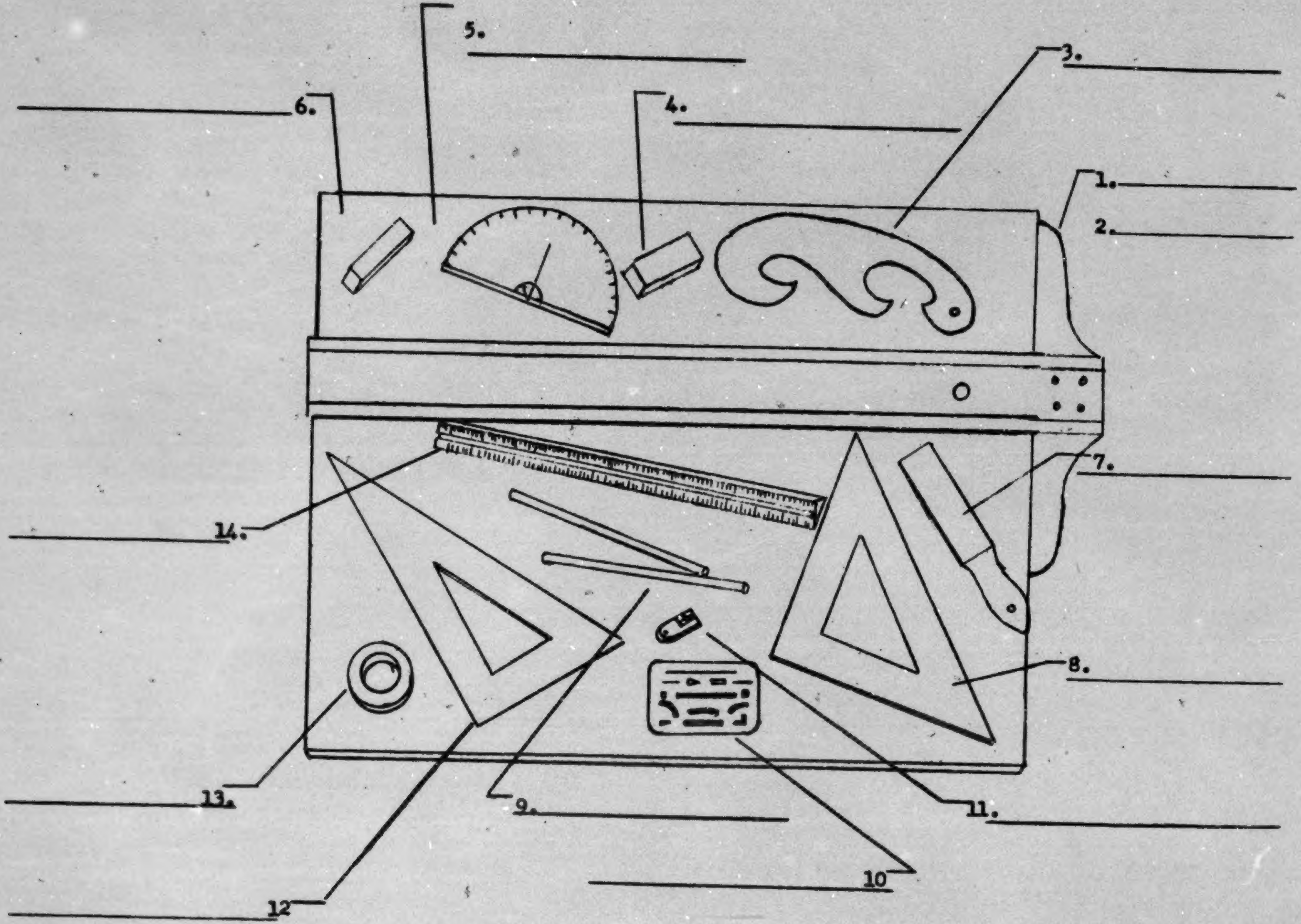

3/8
10°
15°
SANDPAPER
(A)
LONGCUT
(B)
(C)
SHOULDER PAPER

SHARPEN COMPASS LEAD

SKETCHING AND DRAWING EQUIPMENT

ASSIGNMENT SHEET #1 - IDENTIFY DRAFTING EQUIPMENT

A. Identify the drawing equipment on the following page by filling in the blanks with the correct answer.


1.
2.
3.
4.
5.
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7.
8.
9.
10
11.
12
13.
14.

SKETCHING AND DRAWING EQUIPMENT

ASSIGNMENT SHEET #2 - NAME AND DRAW TEN DIFFERENT TYPES OF DRAWING LINES.

SKETCHING AND DRAWING EQUIPMENT

ASSIGNMENT SHEET #3 - AFTER STUDYING TM 1-4

A. Draw a 4½ inch circle with a large bow compass.

B. Draw a 2¼ inch circle with a small bow compass.

C. Check the work on both of the circles that have just been completed with a set of dividers.

SKETCHING AND DRAWING EQUIPMENT

ASSIGNMENT SHEET #4 - AFTER STUDYING TM 1-4

A. Draw a box in the center of this sheet of paper with a vertical height of 7 inches and a horizontal length of 4½ inches.

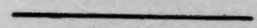
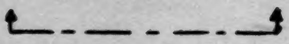
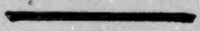
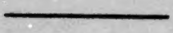
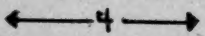
SKETCHING AND DRAWING EQUIPMENT

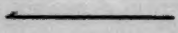
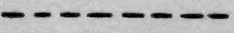
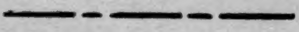
ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1. T-Square
2. Drawing Board
3. French Curve
4. Soft Pink Eraser
5. Protractor
6. Firm Red Eraser
7. Sandpaper Pad
8. 45-45-90° Triangle
9. Drawing Pencils
10. Erasing Shield
11. Pencil Pointer
12. 30-60-90° Triangle
13. Drafting Tape
14. Scale Triangle

Assignment Sheet #2

1. Visible line 
2. Cutting Plane Line 
3. Border Line 
4. Construction Line 
5. Dimension Line 

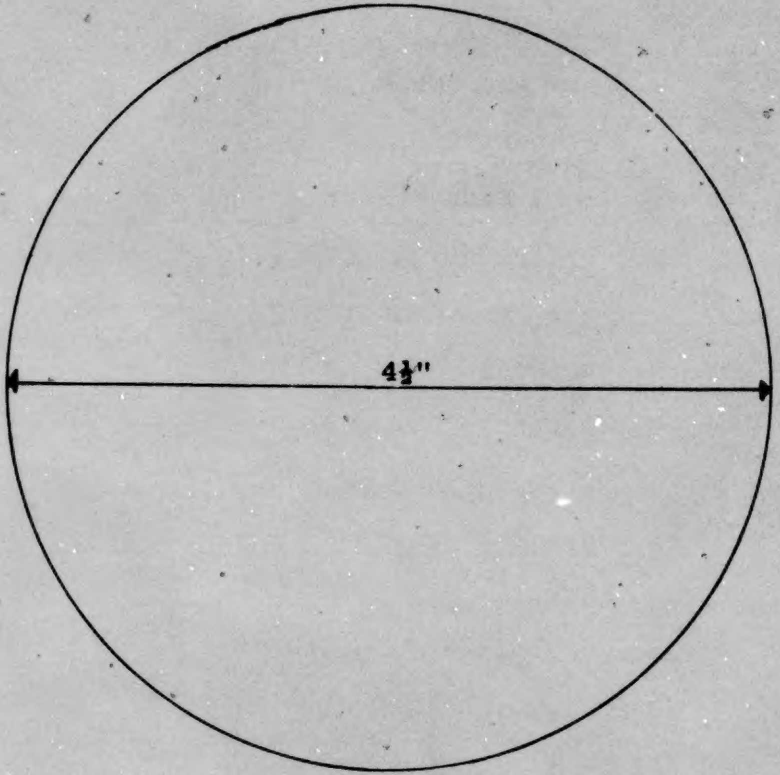
6. Extension Line 
7. Hidden Line 
8. Center Line 

9. **Section Line** ▨

10. **Phantom Line** — -- — -- —

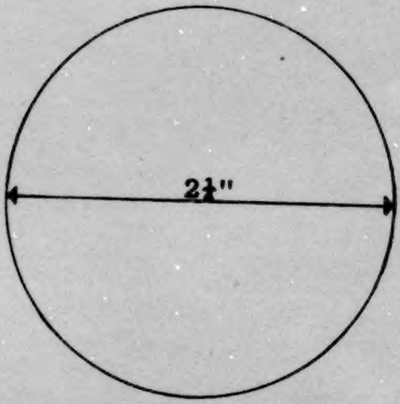
Assignment Sheet #3

A.



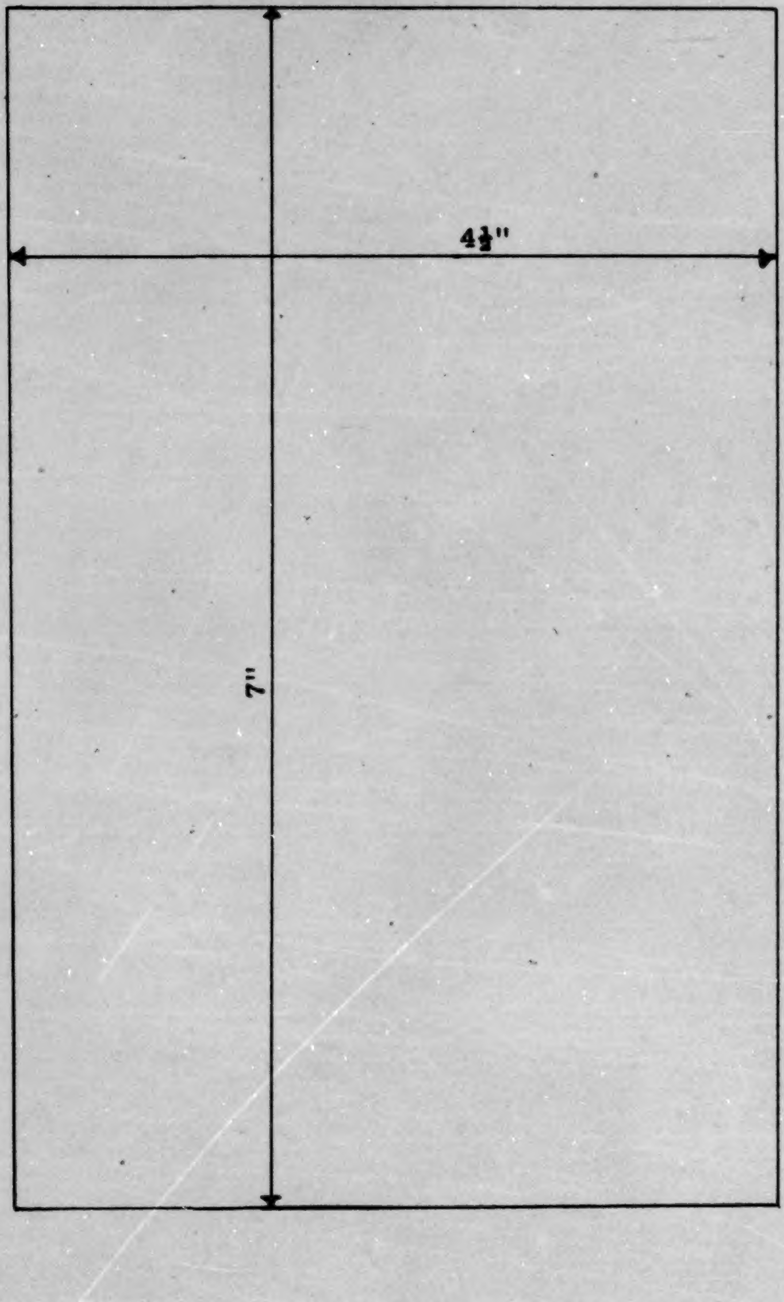
B.

C.



Assignment Sheet #4

A.



SKETCHING AND DRAWING EQUIPMENT

TEST

I. Matching

A. Match terms associated with sketching and drawing tools with correct definition.

A. Equipment used in percision drawing.

B. Used in the removing of pencil and pen drawing errors.

C. A slender cylinder or strip of black lead, colored chalk, etc., usually incased in wood for writing or drawing.

D. Used to point the end of a pencil. This type is normally mechanical.

E. Layers of sandpaper mounted on wood, used for pointing or sharpening lead for writing or drawing.

F. Horizontal lines are drawn with the T-square. It also supports triangles when being used to draw vertical and inclined lines.

G. A figure (formerly the area, now commonly the three bounding lines) formed by three lines intersected by two's in three points and so forming three angles or sets of angles.

H. Tools used in the drawing and inking of geometric designs. Also used in measuring and finding unknown points.

I. A gauge, pattern or mold commonly a thin plastic used as a guide to the form of the work.

___ 1. Pencils

___ 2. T-Square

___ 3. Erasers

___ 4. Lead Pointer

___ 5. Sharpener

___ 6. Drafting Equipment

___ 7. Triangle

___ 8. Instrument Set

___ 9. Line

___10. Compass

___11. Template

___12. Dividers

J. A mark of division or outline as on a drawing.

K. An instrument for dividing lines.

L. A tool used to draw cirlces, arches and geometric designs.

II. Identify Drafting Equipment

A. Place an "X" in front of each of the following terms which are drafting equipment.

___ 1. T-Square
___ 2. Drawing Board
___ 3. French Curve
___ 4. Soft Pink Eraser
___ 5. Protractor
___ 6. Firm Red Eraser
___ 7. Sandpaper Pads
___ 8. 45-45-90° Triangle
___ 9. Drafting Pencils
___10. Erasing Shield
___11. Pencil Pointer
___12. 30-60-90° Triangle
___13. Drafting Tape
___14. Scale Triangles

III. Identify Erasers

A. Mark an "X" in the blank that is correct.

___ 1. Firm Red Eraser
___ 2. Soft Green Eraser
___ 3. Hard Yellow Eraser
___ 4. Soft Pink Eraser
___ 5. Art Gum
___ 6. Vinylite Vellum
___ 7. Dry Cleaning Pad
___ 8. Eraser Shields
___ 9. Orange Eraser
___10. Blue Eraser
___11. Electric Erasers
___12. Dusting Brush

IV. Identify Pencils, Sharpeners and Lead Pointers

A. Match correct term to correct definition.

___	1. Sharpeners	A. 9H - 8H - 7H - 6H - 5H - 4H
___	2. Medium	B. 3H - 2H - H - F - HB - B
___	3. Hard	C. 2B - 3B - 4B - 5B - 6B - 7B

___	4. Lead Pointer	D. Used to make points on the writing ends of pencils.
___	5. Soft	E. Used to put a fine point on the writing end of a pencil.

V. Distinguish between T-square and triangle.

VI. Distinguish between instrument sets and templates.

VII. Name and draw ten different types of lines.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

VIII. Name three different types of dividers.

A.

B.

C.

IX. Name three different types of compasses.

A.

B.

C.

X. Demonstrate the ability to:

A. Use compass and divider.

B. Use T-square and triangle.

C. Name and draw ten different types of drawing lines.

XI. Turn assignment sheet #1 in to instructor.

XII. Turn assignment sheet #2 in to instructor.

XIII. Turn assignment sheet #3 in to instructor.

XIV. Turn assignment sheet #4 in to instructor.

SKETCHING AND DRAWING EQUIPMENT

TEST

I. 1. C
2. F
3. B
4. E
5. D
6. A
7. G
8. H
9. J
10. L
11. I
12. K

II. All should be marked with an "X".

III. 1.
2.
4.
5.
6.
7.
8.
11.
12.

IV. 1. D
2. B

3. A

4. E

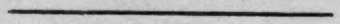
5. C

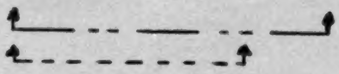
V. T-squares are used to draw horizontal lines and to support triangles in the drawing of vertical and inclined lines.

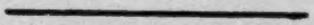
Triangles on the other hand are used to draw vertical and incline lines as they rest on the T-square.

VI. Instrument sets are tools used in the drawing or inking of geometric designs and can be used to find unknown points in some cases.

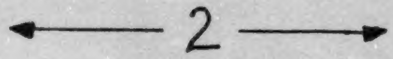
Templates however, are used as a gauge, pattern or mold, commonly a thin plastic. A template has precut and measured wholes that are accurate to a specific scale. The scale will vary as to need.

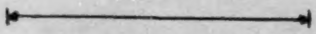
VII. 1. Visible Lines (Thick) 

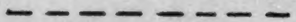
2. Cutting Plane Line (Thick) 

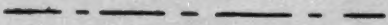
3. Border Line (Very Thick) 

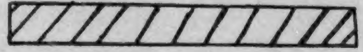
4. Construction Line (Very Thin)

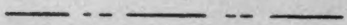
5. Dimension Line (Thin) 

6. Extension Line (Thin) 

7. Hidden Line (Thick) 

8. Center Line (Thick) 

9. Section Line (Thin) 

10. Phantom Line (Thin) 

VIII. 1. Wheel

2. Fraction

3. Proportional

IX. 1. Small Bow

2. Large Bow

3. Drop Spring Bow

X. A. To be determined by instructor.

B. To be determined by instructor.

C. To be determined by instructor.

XI. To be determined by instructor.

XII. To be determined by instructor.

XIII. To be determined by instructor.

XIV. To be determined by instructor.

SECTION B

UNIT II

GOTHIC LETTERING

GOTHIC LETTERING

TERMINAL OBJECTIVE

After completion of this unit, the student will be able to describe an object. The student will also know the sequence and direction of strokes that are used to draw the shape of different letters and numerals. This knowledge will be demonstrated by scoring at least eighty percent on the final test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Match terms associated with Gothic lettering to the correct definition.

II. Draw six sets of horizontal guide lines.

III. Draw letters formed with vertical and horizontal strokes as viewed on TM 2-2.

IV. Draw letters Z, X and K. (TM 2-3)

V. Draw letters formed with oblique strokes found on TM 2-4.

VI. Draw letters formed with curved strokes found on TM 2-4.

VII. Draw letters formed with combined straight and curved strokes found on TM 2-4.

VIII. Draw the symbol for the term "ampersand".

IX. Draw vertical numerals 3/16" high.

X. Draw alphabet in letters using single stroke Gothic inclined form found on TM 2-2.

GOTHIC LETTERING
(Vertical Single-Stroke Gothic Lettering)

SUGGESTED ACTIVITIES

I. Instructor:

   A. Provide students with objective sheet.

   B. Provide students with information and assignment sheets.

   C. Make transparencies.

   D. Discuss terminal and specific objectives.

   E. Discuss information and assignment sheets.

   F. Direct students through the different learning paths for each specific objective.

   G. Discuss and show an example of using a standard format in sketching and drawing Gothic letters.

   H. Give test.

II. Student:

   A. Read objectives.

   B. Study information sheet.

   C. Complete each assignment sheet.

   D. Be able to perform according to the type of performance called for by each specific objective.

   E. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

   A. Objectives

   B. Information sheets

   C. Transparency masters

1. TM 2-1 - How to Make Strokes

2. TM 2-2 - Spacing Lettering Strokes

3. TM 2-3 - Vertical, Horizontal and Oblique
   Strokes

4. TM 2-4 - Vertical Guide and Incline

5. TM 2-5 - Lettering

D. Assignment sheets

1. Assignment sheet 2-#1 - Terms and Definitions

2. Assignment sheet 2-#2 - Drawing the Horizontal
   Guide

3. Assignment sheet 2-#3 - Single Stroke Gothic
   Vertical Lettering

4. Assignment sheet 2-#4 - Single Stroke Gothic
   Inclined Lettering

5. Assignment sheet 2-#5 - Letter Constancy

E. Answers to assignment sheets.

F. Test

G. Answers to test

II. References:

A. Hornung, W.J. Architectural Drafting, Englewood
Cliff, New Jersey, Prentice Hall, Inc.

B. Gresicke, Mitchell, Spencer and Hill, Technical
Drafting, New York, McMillan Publishing Co. Inc.

GOTHIC LETTERING
(Vertical Single-Stroke Gothic Lettering)

INFORMATION SHEET

I. Terms and definitions:

A. GOTHIC LETTERS - Letters of straight lines of even width.

B. VERTICAL STYLE - Upright

C. INCLINED STYLE - To slant

D. LOWER CASE - Small letters

E. HORIZONTAL - Flat and even

F. CONICAL - Shaped like a cone.

G. OBLIQUE - A slanting position neither perpendicular nor horizontal.

H. "AMPERSAND" - A sign meaning "and".

II. Horizontal guide: TM 2-1

The objective of drawing a horizontal guide is to teach students to use thier drawing instruments accurately. The following procedure will be used:

A. Use the sheet (Assignment sheet 2-1) already prepared with the margin lines and title strip.

B. From the lower line of the title strip,measure down 3/4" and place a dot. From this dot, continuing downward, point off three more dots 1/8" apart. Again draw a light horizontal line through each dot.

C. Next, measure down 1/2" and place a dot. Point off three more dots 1/8" apart. Again, draw a light horizontal line through each dot.

D. Repeat step 3, four times. When completed you should have six sets of horizontal guide lines.

E. Now, measure down 3/8" and place a dot. From this dot, point off three more dots 1/16" apart. Then draw a light horizontal line through each dot.

INFORMATION SHEET

F. Repeat step 5, four more times. When completed, you should have five more sets of horizontal guide lines.

G. On the lower margin line beginning 1" from the left end, point off 1/2" spaces all the way across the line.

H. From each of these points draw a light vertical line upward to the title strip. When you draw these lines your T-square and the 30-60° triangle should be in the position for vertical guide lines.

III. The objective of drawing letters formed with vertical and horizontal strokes is to teach the students the order in which the strokes are made. Spacing is also introduced. (Refer to TM 2-2)

IV. The objective of drawing the letters Z, X and K introduces the student to the combination of vertical, horizontal and oblique strokes. (Refer to TM 2-3)

V. A light free hand vertical guide line should first be sketched to mark the center of these letters. Then the widths are pointed off and the oblique strokes are made. (Refer to TM 2-4)

VI. It is advisable to first sketch freehand approximate circles and then to form the letters with the strokes indicated. (TM 2-4)

VII. This final group of letters are combinations of straight and curved strokes. (TM 2-4)

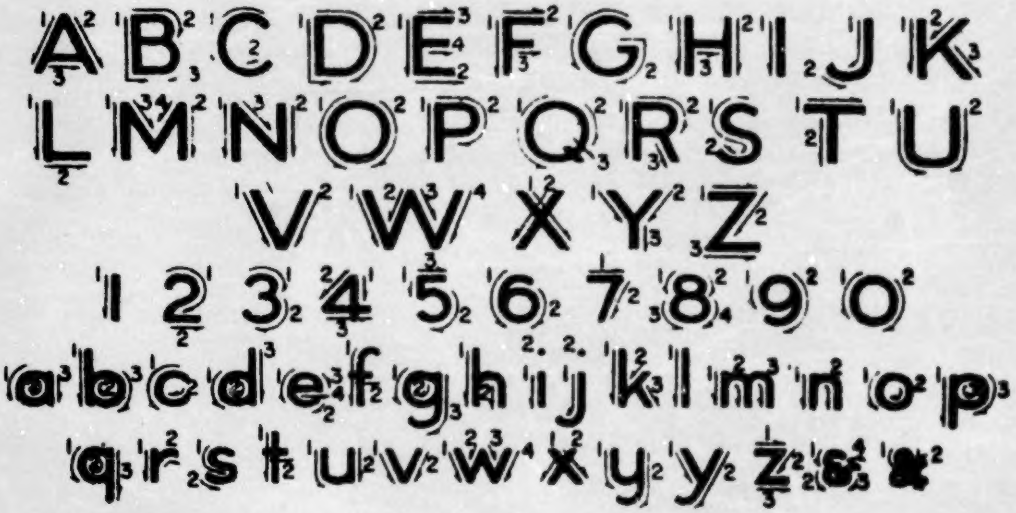
VIII. The symbol called "ampersand" is sometimes used in place of the word "and". (Refer to TM 2-2)

IX. Letters of this height will be used in the title strip and for notes on drawings.

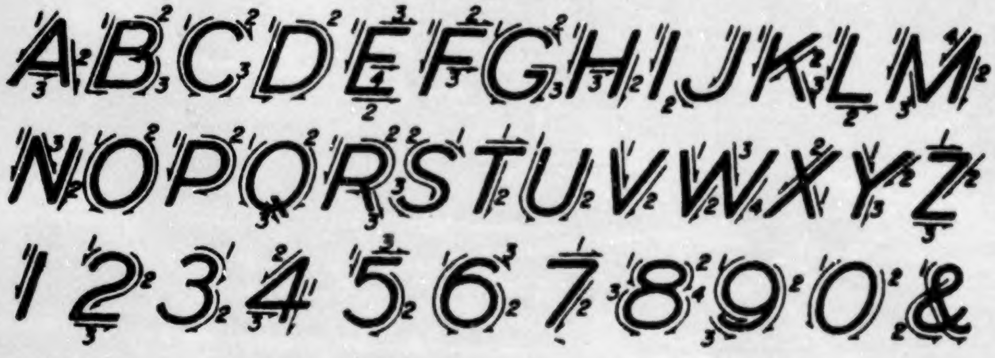
X. Learning to draw inclined letters gives the student more variety in lettering. (TM 2-2)

HOW TO MAKE STROKES

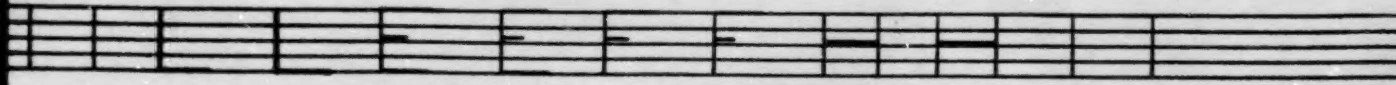
SINGLE STROKE GOTHIC VERTICAL


A B C D E F G H I J K
L M N O P Q R S T U
V W X Y Z
1 2 3 4 5 6 7 8 9 0
a b c d e f g h i j k l m n o p
q r s t u v w x y y z & &

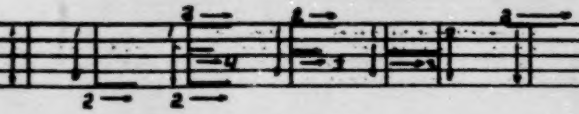
SINGLE STROKE GOTHIC INCLINE
(67½ degrees)

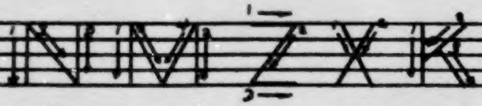

A B C D E F G H I J K L M
N O P Q R S T U V W X Y Z
1 2 3 4 5 6 7 8 9 0 &

SPACING LETTERING STROKES

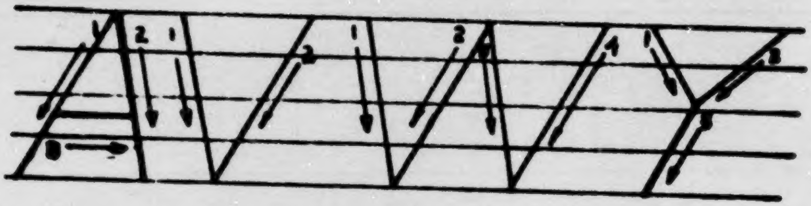


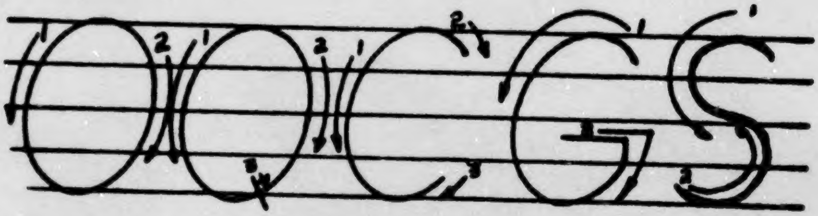
VERTICAL, HORIZONTAL AND OBLIQUE STROKES

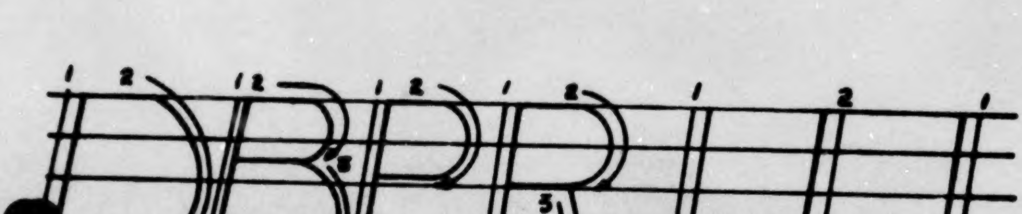




VERTICAL GUIDE AND INCLINE







LETTERING

GOTHIC LETTERING

ASSIGNMENT SHEET #2-1 - TERMS AND DEFINITIONS

Match the following terms with the correct definition.

___1. A symbol meaning "and"

___2. Small letters

___3. Letters of straight lines of even width.

___4. Upright

___5. Shaped like a cone.

___6. A slanting position neither perpendicular nor horizontal.

___7. To slant

___8. Flat and even

A. Gothic Lettering

B. Vertical Style

C. Inclined Style

D. Lower Case

E. Horizontal

F. Conical

G. Oblique

H. "Ampersand"

GOTHIC LETTERING

ASSIGNMENT SHEET #2-2 - DRAWING THE HORIZONTAL GUIDE

Draw five horizontal guide lines. Refer to TM 2-1. The student will use this assignment to complete assignment sheets #2-3 and #2-4.

Before proceeding with lettering, instructor must check these guides.

GOTHIC LETTERING

ASSIGNMENT SHEET #2-3 - SINGLE STROKE GOTHIC VERTICAL LETTERING

Directions: Complete each section and turn it in to the instructor for evaluation.

I. Draw 26 letters formed with vertical and horizontal strokes. (Refer to TM 2-2)

II. Draw five of each letter Z, X and K.

III. Draw five of each letter formed with oblique strokes. That will be letters N, M, Z, X, K, A, V, W and Y.

GOTHIC LETTERING

ASSIGNMENT SHEET #2-3 - SINGLE STROKE
GOTHIC VERTICAL LETTERING

IV. Draw five of each letter formed with curved strokes. That will be letters O, Q, G and S.

V. Draw five of each letter formed with combined straight and curved strokes. That will be letters D, B, P, R, V and J.

VI. Draw five of each symbol for the term "ampersand".

VII. Draw five of each vertical numeral 3/16" high.

GOTHIC LETTERING

ASSIGNMENT SHEET #2-4 - SINGLE STROKE GOTHIC INCLINED LETTERING

Repeat all exercises 1-7 on assignment sheet #2-3 using inclined Gothic letters rather than vertical Gothic letters.

Turn in to instructor upon completion.

GOTHIC LETTERING

ASSIGNMENT SHEET #2-5 - LETTER CONSTANCY

Read and study the information below. Answer the true and false statements at the end of the assignment. Write the word true if the statement is true and false if the statement is false.

LETTERING is used on drawings to give dimensions and other pertinent information needed to fully describe the item. The lettering must be neat and legible if it is to be easily read and understandable.

A drawing will be improved by good lettering. A good drawing will look sloppy and unprofessional if the lettering is poorly done.

SINGLE STROKE GOTHIC ALPHABET

The American National Standards Institute (originally ASA) recommends that SINGLE STROKE GOTHIC ALPHABET be the accepted lettering standard because it can be drawn rapidly and is highly legible. It is called single stroke lettering not because each letter is made with a single stroke of the pencil (most letters require several strokes to complete) but because each line is only as wide as the point of the pencil or pen.

Single stroke lettering may be vertical or inclined as there is no definite rule stating that it should be one or the other. However, mixing them on a drawing should be avoided.

ONLY ONE FORM OF LETTERING SHOULD APPEAR ON A DRAWING

AvoID cOmBiNiNg SeVeral foRMs Of
LeTTeRiNG

You can do first class lettering if you learn the basic shapes of the letters, the proper stroke sequence for making them and the recommended spacing between letters and words. You must also practice regularly.

LETTERING WITH A PENCIL

An H or 2H pencil is used by most draftsmen for lettering. Sharpen the pencil to a sharp conical point and rotate it as you letter to keep the point sharp and the letters

GOTHIC LETTERING

ASSIGNMENT SHEET #2-5 - LETTER CONSTANCY

uniform in weight and line width. Resharpen the pencil when the lines become wide and "fuzzy".

GUIDE LINES

Good lettering requires the use of guide lines. Guide lines are very fine lines made with a "needle sharp" 4H or 6H pencil. Guide lines should be drawn so lightly they will not show up on a print made from the drawing. VERTICAL GUIDE LINES May be used to assure that the letters will be vertical. Use INCLINED GUIDE LINES drawn at 67½° to the horizontal line where inclined lettering is to be used.

ALWAYS USE GUIDE LINES

VERTICAL GUIDE LINE HELP
IN KEEPING LETTERS
UNIFORMLY VERTICAL

INCLINED GUIDE LINES HELP
KEEP LETTERING UNIFORM

Write the word true if the statement is true and false if the statement is false.

__________1. Lettering is used on drawings to give dimensions and other information needed to describe the item.

__________2. The American National Standards Institute does not recommend the Single Stroke Gothic Alphabet.

__________3. It is called single stroke because each letter is made with a single stroke of the pencil.

GOTHIC LETTERING

ASSIGNMENT SHEET #2-5 - LETTER CONSTANCY

__________4. Professionals mix vertical and inclined letters as there is no definite rule stating that it should be one or the other.

__________5. An "H" or "2H" pencil is used by most draftsmen for lettering.

__________6. Use INCLINED GUIDE LINES drawn 67½ degrees to the horizontal line where inclined lettering is to be used.

GOTHIC LETTERING

ANSWERS TO ASSIGNMENT SHEETS

Assignment sheet #2-1

1. H
2. D
3. A
4. B
5. F
6. G
7. C
8. E

Assignment sheet #2-2

Check students assignment sheet according to TM 2-1.

Assignment sheet #2-3

I. Check students assignment sheet according to TM 2-2.

II. Check students assignment sheet according to TM 2-3.

III. Check students assignment sheet according to TM 2-4.

IV. Check students assignment sheet according to TM 2-4.

V. Check students assignment sheet according to TM 2-4.

VI. Check students assignment sheet according to TM 2-2.

VII. Answer to be determined by instructor.

Assignment sheet #2-4

Check students assignment sheet according to bottom section of TM 2-2.

GOTHIC LETTERING

Assignment sheet #2-5

1. True
2. False
3. False
4. False
5. True
6. False

GOTHIC LETTERING

TEST

I. Match terms with the correct definition.

___A. A symbol meaning "and".

___B. Small letters.

___C. Letters of straight lines of even width.

___D. Upright.

___E. Shaped like a cone.

___F. A slanting position neither perpendicular nor horizontal.

___G. To slant.

___H. Flat and even.

1. Gothic Lettering
2. Vertical Style
3. Inclined Style
4. Lower Case
5. Horizontal
6. Conical
7. Oblique
8. "Ampersand"

II. Turn in assignment sheet #2-1.

III. Draw the entire alphabet of capital letters in single stroke Gothic Vertical.

Show the strokes used.

IV. Draw letters Z, X and K.

V. Draw letters formed with oblique strokes.

VI. Draw letters formed with curved strokes.

VII. Draw letters formed with combined straight and curved strokes.

VIII. Draw the symbol for the term "ampersand".

IX. Draw vertical numerals 1-9, 3/16" high in single stroke Gothic.

X. Draw the alphabet in single stroke Gothic inclined form.

GOTHIC LETTERING

ANSWERS TO TEST

I. A. 8
   B. 4
   C. 1
   D. 2
   E. 6
   F. 7
   G. 3
   H. 5

II. To be turned in by student.

III. Check with TM 2-1.

IV. Check with TM 2-3.

V. Check with TM 2-4.

VI. Check with TM 2-4.

VII. Check with TM 2-4.

VIII. Check with TM 2-2.

IX. Check with TM 2-2.

X. Check with TM 2-2.

SECTION C

UNIT III

LAYOUT OF A STANDARD SHEET

LAYOUT OF A STANDARD SHEET

TERMINAL OBJECTIVE

After completion of this unit, the student will be able to prepare the margin and title strip for a drawing. This knowledge will be evidenced through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Match terms associated with drafting to the correct definition.

II. Layout a standard sheet on the drawing board.

III. State the standard size of drawing paper.

IV. Learn the purpose of trimming lines and be able to list them.

V. List the purpose of the margin lines.

VI. List the width of the margin at the left of the drawing.

VII. List the width of the other three margins.

VIII. List the width of the title strip.

IX. List the length of:

  a. The first space in the title strip

  b. The second space

  c. The third space

  d. The last space

LAYOUT OF A STANDARD SHEET

SUGGESTED ACTIVITIES

I. Instructor:

   A. Provide students with objective sheet.

   B. Provide students with information and assignment sheet.

   C. Make transparencies.

   D. Discuss terminal and specific objectives.

   E. Discuss information and assignment sheets.

   F. Give test.

   G. Review test by discussion.

   H. Retest, if necessary.

II. Students:

   A. Read objective sheet.

   B. Study information sheets.

   C. Complete assignment sheets.

   D. Participate in class discussion concerning each completed assignment sheet.

   E. Take test.

   F. Review test.

   G. If student has not completed at least eighty percent accuracy on test, review assignment sheets and class discussion.

   H. Retake test, if necessary.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

   A. Objectives

B. Information sheet

C. Transparency masters

  1. TM 3-1 - Tools of Drafting

  2. TM 3-2 - Angles

  3. TM 3-3 - Layout Sheet

  4. TM 3-4 - Layout Sheet

  5. TM 3-5 - Layout Sheet

D. Assignment sheets

  1. Assignment sheet #1 - Terms and Definitions

  2. Assignment sheet #2 - Layout of a Standard Sheet

  3. Assignment sheet #3 - Different Styles of Layouts

E. Answers to assignment sheets

F. Test

G. Answers to test

II. References:

A. Walker, John R., Exploring Drafting, South Holland, Illinois, The Goodheart Wilcox Co., Inc.

LAYOUT OF A STANDARD SHEET

INFORMATION SHEET

I. Terms and definitions:

A. DRAWING BOARD - A smooth flat surface on which the drawing paper is placed. It is often made of soft wood and should be at least 18 inches wide and 24 inches long. The left edge of the drawing board should be perfectly straight so that it may accurately guide the T-square. (TM 3-1)

B. T-SQUARE - Shaped like the letter T. It has two parts called the head and the blade. The blade forms two right angles with the head. When drawing lines, the head should always be held firmly against the left edge of the board with the left hand. (TM 3-1)

C. 30°-60° and 45° Triangle - Used for drawing both vertical lines and sloping lines. They are usually held against the upper edge of the T-square Blade and lines are drawn from the bottom towards the top. (Refer to TM 3-1)

D. HORIZONTAL LINE - One which is level or parallel with the horizon. (TM 3-1)

E. VERTICAL LINE - One which is perpendicular to a horizontal line. (TM 3-1)

F. VERTICAL LETTERING - Letters that are straight up and down. (TM 3-2)

G. INCLINED LETTERING - Letters that are at an angle. (TM 3-2)

II. Layout a standard sheet on the drawing board.

Refer to assignment sheet #2 for exercise.

III. Size of drawing paper.

A. 8½ inches wide and 11 inches long.

IV. Trimming lines.

A. Guide lines used to trim paper to 8½" by 11".

V. Purpose of margin lines.

A. Lines that work is done inside of.

INFORMATION SHEET

VI. Width of margin at the left of the drawing.

- A. ½" usually.

VII. Width of the other three margins.

- A. ½" for our purpose.

VIII. Width of the title strip.

- A. ½" for our purpose.

IX. Length of:

- A. The first space in title strip.
  - 1. 3
- B. The second space.
  - 1. 3
- C. The third space.
  - 1. 2
- D. The fourth space.
  - 1. 2

TOOLS OF DRAFTING

LAYOUT OF A STANDARD SHEET

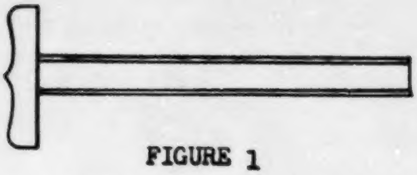


FIGURE 1

THE T-SQUARE

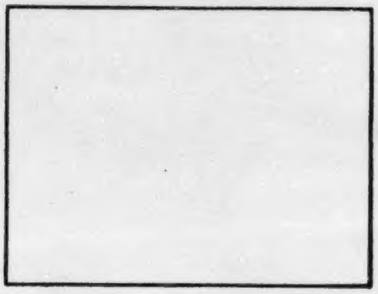


FIGURE 2
DRAWING BOARD

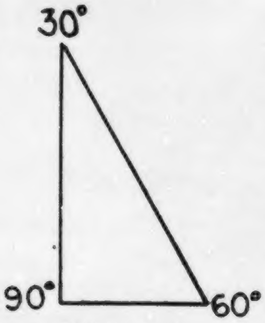


FIGURE 3

THE 30° - 60° TRIANGLE

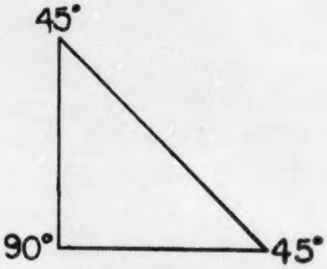


FIGURE 4
THE 45° TRIANGLE

FIGURE 5
HORIZONTAL LINE

FIGURE 6
VERTICAL LINE

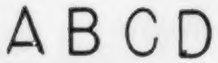


FIGURE 7
VERTICAL LETTERING

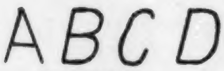


FIGURE 8
HORIZONTAL LETTERING

ANGLES

LAYOUT OF A STANDARD SHEET

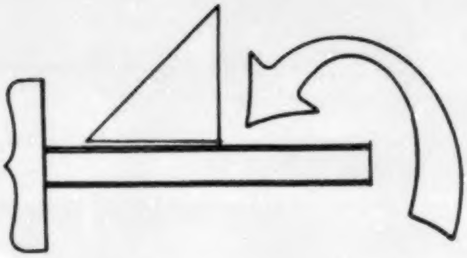


FIGURE 1

POSITION OF TRIANGLE FOR
DRAWING VERTICAL LINES

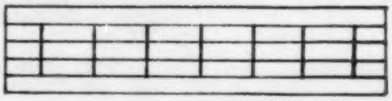


FIGURE 2

GUIDE LINES FOR VERTICAL
LETTERING

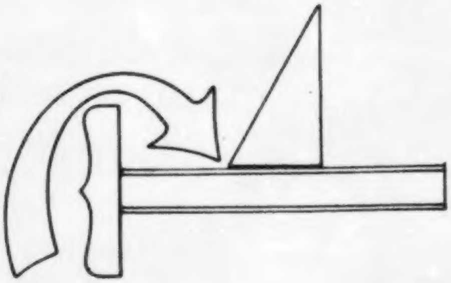


FIGURE 3

TRIANGLE FOR DRAWING
SLOPING GUIDE LINES

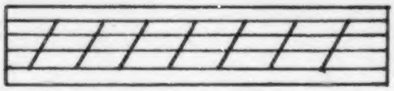


FIGURE 4

GUIDE LINES FOR INCLINED
LETTERING

NAME	DRAWING #	SCALE	DATE

LAYOUT SHEET

EFBL - 11-C

NAME	DATE	SCALE

NAME	DATE	SCALE

LAYOUT OF A STANDARD SHEET

ASSIGNMENT SHEET #1 - TERMS AND DEFINITIONS

Match the following terms with the correct definition.

___ 1. Drawing Board

___ 2. T-Square

___ 3. Triangle

___ 4. Horizontal Line

___ 5. Vertical Line

___ 6. Standard Sheet

___ 7. Trimming Lines

___ 8. Margin Lines

___ 9. Left Margin Width

___10. Other Margin Width

___11. Title Strip Width

12. Length of Spaces

___ A. 1st Space

___ B. 2nd Space

___ C. 3rd Space

___ D. 4th Space

A. Lines that when drawn on paper and cut, the paper measures 8½" wide and 11" long.

B. It has two parts called the head and the blade.

C. Letters that are straight up and down.

D. ½" margin from the left edge.

E. A line that is parallel with the horizon.

F. 2"

G. A figure having three angles and three sides; used for degrees.

H. 2"

I. Letters that are written on an angle.

J. A line that is perpendicular to a horizontal line.

K. ½" from three edges.

L. 3"

M. 3"

N. A board made of soft wood and should be at least 18 inches wide and 24 inches long.

O. Standard size sheet is 8½" by 11".

P. Lines that the work is done inside of.

Q. ½"

LAYOUT OF A STANDARD SHEET

ASSIGNMENT SHEET #2 - PROCEDURE FOR LAYING OUT A STANDARD SHEET

The step-by-step procedure which follows will teach the students to prepare the margin and title strip for drawings. Read and do each detailed step carefully.

I. Place the drawing paper on the drawing board in the approximate center from left to right. The upper edge of the paper should be near the top of the board. Pin down one of the upper corners with a thumb tack or use adhesive drafting tape to hold the paper on the board.

II. Place the head of a T-square against the left edge of the board and slide it up to the top edge of the paper.

III. Move the paper until the top edge is parallel with the upper edge of the T-square. Then pin down the other three corners. (If preferred, the corners of the paper may be held down with drafting tape instead of thumb tacks.)

IV. (It is assumed in steps 4 to 7 that the paper is larger that 11" X 17". If the sheet is cut to 11" X 17", proceed with step 8.) Hold the T-square frimly against the left edge of the board and draw a light horizontal line from left to right across the paper near the top edge.

V. Place the scale on the paper at right angles to this line. Then measure down 11" from the line and place a dot. Again, with the T-square held firmly against the left edge of the board, draw a light horizontal line through the dot. If the two lines are drawn correctly they should be parallel.

VI. Place your 30°-60° triangle against the upper edge of the T-square with the vertical side of the triangle at the left. (Refer ro TM 3-2 figure 1.) Then draw a light vertical line near the left edge of the paper. Remember to draw along the left edge of the triangle from the bottom toward the top.

VII. Place the scale in a horizontal position. From the vertical line measure 12" and place a dot, from the dot measure 5" and place another dot. Through the second dot draw a vertical line along the left edge of the triangle. These two lines should be parallel and 17" apart.

(The four lines that have been drawn are the cutting and trimming lines. When the drawing is completed, cut the paper on these lines and it will be 11" wide and 17" long.)

VIII. Measure 1" toward the center from the left vertical trimming lines (or from the left edge). From the other three trimming lines (or from the other three edges) measure ½" toward the center, placing dots. Draw lines through these dots. These four lines are called margin lines. The 1" margin at the left side allows space for fastening your drawings in a folder.

IX. Measure downward 3/4" from the upper margin line and draw another horizontal line. Draw this line from the left margin line to the right margin line. The ½" wide space is the title space or the title strip.

X. In this space, beginning at the left, measure 5", another 5" and then 3½". Draw vertical lines at these points.

XI. Now prepare the title strip for lettering as follows: First measure down from the top margin line 1/8" and place a dot. Then, continuing downward from this dot measure 1/16" three times and place dots. Measure 1/8" again and finally 1/16" three more times.

XII. Through these eight dots draw very light horizontal lines across the paper. These lines are called horizontal lines. The guide lines are drawn to aid you with your freehand lettering.

XIII. For vertical lettering, draw a series of vertical lines about ¼" apart across the horizontal guide lines. These are called vertical guide lines. The lines in the title strip should look like those in TM 3-2, figure 2.

XIV. For inclined lettering, a slope of 2 to 5 is used. From the upper left hand corner of the margin lines measure on the horizontal lines two ¼" spaces (½"). On the vertical line measure five ¼" spaces (1¼"). Arrange your T-square and the 30°-60° triangle as shown on TM 2. Keep the T-square stationary and lightly draw a series of sloping lines along the left side of the triangle. These lines should be about ¼" apart and should cross the horizontal guide lines. The lines in the title strip should look like figure 4. (TM 2)

XV. Hand in work to instructor.

LAYOUT OF A STANDARD SHEET

ASSIGNMENT SHEET #3 - DIFFERENT STYLES OF LAYOUTS

I. Draw one example of TM 3-3.

II. Draw one example of TM 3-4.

III. Draw one example of TM 3-5.

LAYOUT OF A STANDARD SHEET

ANSWERS TO ASSIGNMENT SHEETS

Assignment sheet #1

1. N
2. B
3. G
4. E
5. J
6. O
7. A
8. P
9. D
10. K
11. Q
12. A. L or M
    B. L or M
    C. H or F
    D. H or F

Assignment sheet #2

Student will hand in work for evaluation by the instructor.

Assignment sheet #3

Student will hand in work as part as the final exam.

LAYOUT OF A STANDARD SHEET

TEST

I. Match the following terms associated with drafting to the correct definition.

___ A. One which is perpendicular to a horizontal line.

___ B. Letters that are straight up and down.

___ C. A smooth flat surface on which the drawing paper is placed. It is often made of soft wood and should be at least 18" wide and 24" long. The left edge of the drawing board should be perfectly straight so that it may accurately guide the T-square.

1. Drawing Board
2. T-Square
3. 30°-60° and 45° Triangle
4. Horizontal Line
5. Vertical Line
6. Vertical Lettering
7. Inclined Lettering

___ D. One which is level or parallel with the horizon.

___ E. Used for drawing both vertical lines and sloping lines. They are usually held against the upper edge of the T-square Blade and lines are drawn from the bottom towards the top.

___ F. Letters that are at an angle.

___ G. Shaped like the letter T. It has two parts called the head and the blade. The blade forms two right angles with the head. When drawing lines, the head should always be held firmly against the left edge of the board with the left hand.

II. Hand in layout of a standard sheet on the drawing board.

III. State the standard size of drawing paper.

IV. List the purpose of trimming lines.

V. List the purpose of the margin lines.

VI. List the width of the margin at the left of a drawing.

VII. List the width of the other three margins.

VIII. List the width of the title strip.

IX. List the length of:

A. The first space in the title strip______________

B. The second space in the title strip______________

C. The third space in the title strip______________

D. The last space in the title strip_______________

LAYOUT OF A STANDARD SHEET

ANSWERS TO TEST

I. A. 5
   B. 6
   C. 1
   D. 4
   E. 3
   F. 7
   G. 2

II. Student will hand in work for evaluation by the instructor.

III. 8½" wide and 11" long.

IV. Guide lines used to trim paper to 8½" by 11".

V. Lines that work is done inside of.

VI. ½" usually

VII. ½"

VIII. ½"

IX. A. 3
   B. 3
   C. 2
   D. 2

SECTION D

UNIT IV

JOB ORIENTATION

JOB ORIENTATION

TERMINAL OBJECTIVE

After completion of this unit, the student should be able to match terms associated with agriculture sketching and drawing to the proper definition, select sources to use in finding a job, describe the influence of money, describe the importance of agri sketching and drawing and list the occupational areas of drawing. This knowledge will be evidenced through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Match terms associated with agriculture sketching and drawing to thier correct definition.

II. Select from a list the sources used in finding a job.

III. Select from a list the factors that should be considered when choosing an occupation.

IV. Select from a list the expectations an employer has of its employees.

V. Select from a list the expectations an employee has of its employer.

VI. Select from a list steps to take in obtaining a job.

VII. List information to be supplied to an employer.

VIII. Match broad occupational areas of sketching and drawing to the sub areas.

IX. Complete a self information sheet.

X. Complete plans for getting started in a sketching and drawing occupation.

XI. Complete a sketching and drawing worksheet.

JOB ORIENTATION

SUGGESTED ACTIVITIES

I. Instructor:

  A. Provide students with objective sheet.

  B. Provide students with information sheet.

  C. Discuss unit and specific objectives.

  D. Discuss information and assignment sheets.

  E. Give test.

II. Students:

  A. Read Objective sheet.

  B. Study information sheet.

  C. Complete assignment sheets.

  D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

  A. Objective sheet

  B. Information sheet

  C. Assignment sheets

    1. Assignment Sheet #1 - Self Information

    2. Assignment Sheet #2 - Plans for Getting Started in a Sketching and Drawing Occupation

    3. Assignment Sheet #3 - Sketching and Drawing Worksheet

  D. Test

  E. Answers to test

II. References:

A. Carlile, Robert, Sales and Service, Stillwater, Oklahoma, Mid America Vocational Curriculum Consortium, Inc. 1976.

JOB ORIENTATION

INFORMATION SHEET

I. Terms and definitions:

- A. SKETCH - An outline or rough draft or plan of any design. A preliminary draft.
- B. DRAW - To bring forth or out by design or change.
- C. DRAFT - Art of drawing.
- D. AGRICULTURE - Science or art of cultivating the soil, producing crops, raising livestock and all other aspects of preparing these products to move from producer to consumer.
- E. APTITUDE TEST - Helps people single out facts about themselves in relation to thier career interests.
- F. JOB DESCRIPTION - An outline of the duties to be performed on a particular job.
- G. DESIGN - To plan mentally and outline.
- H. LAYOUT - To spread out and prepare.
- I. JOB ANALYSIS - Study of each task that is performed on a job.

II. Sources of finding jobs:

- A. Department of Labor (U.S. Government)
- B. School placement bureau
- C. Former instructors
- D. Former employers
- E. Want advertisements
- F. State Employment Service
- G. Letter of inquiry
- H. Former employees
- I. Friends
- J. Relatives

INFORMATION SHEET

K. Personnel offices

III. Factors which should be determined when choosing an occupation.

A. Interests

B. Hobbies

C. Salary

D. Advancement opportunities

E. Location

F. Working conditions

G. Security for the future

H. Interpersonal relationships with employee and management.

I. Safety

IV. Expectation of employer.

A. Honesty

B. Loyalty

C. Good work habits

D. Cooperation

E. Good working relationships

F. Proper use of ability

V. Expectations of employee.

A. Financial compensation

B. Good working conditions

C. Security

D. Recognition of accomplishment

E. Benefits

INFORMATION SHEET

VI. Steps to take in obtaining a job.

- A. Select your field
- B. Locate job prospects
- C. Prepare a personal resume
- D. Fill out required forms
- E. Schedule an interview
- F. Interview

VII. Information to be supplied to an employer.

- A. References
- B. School transcript or record
- C. List of related experiences
- D. Social security number

VIII. Five broad occupational areas of sketching and drawing and thier sub areas.

- A. Construction
  - 1. Farm Building Contractor
  - 2. Foundation Contractor
  - 3. Plumbing Contractor
  - 4. Electric Contractor
- B. Farm Implement Equipment
  - 1. Designing new equipment
  - 2. Redesigning older equipment
- C. Custom Builders
  - 1. Designing nonconventional equipment
  - 2. Designing custom parts
  - 3. Layout plans on revitalizing old equipment

INFORMATION SHEET

D. Heating and Air Conditioning

  1. Layout wiring
  2. Design new wiring system
  3. Redesign old wiring system

E. Farm

  1. Design farm equipment
  2. Layout farm buildings
  3. Layout farms
  4. Design parts for existing equipment
  5. Landscaping farms, homes, etc.
  6. Maping

JOB ORIENTATION

ASSIGNMENT SHEET #1 - SELF INFORMATION SHEET

Directions: Complete this form for your own personal use.

SELF INFORMATION

Education:

Courses studied:

Courses you did well in:

Courses you did least well in:

Course you enjoyed most:

Why

Course you enjoyed least:

Why

School Activities

List school activities you have been involved in:

Personal data

List your strong points:

List your weak points:

How well do you get along with people?

What personal satisfaction do you derive from work?

Other information you feel would be important or interesting.

Job Experience

List jobs that you have held:

1.

2.

3.

4.

Which one did you like the best?

Explain

Hobbies

1.

2.

3.

4.

Health

What is the status of your health?

List any physical handicaps.

Occupational Choice

List three jobs that you feel at this time you would be most happy with and explain why.

1.

2.

3.

JOB ORIENTATION

ASSIGNMENT SHEET #2 - PLANS FOR GETTING STARTED IN A SKETCHING AND DRAWING OCCUPATION

Directions: Complete the plan for your own use.

My interests are as follows (check any or all)

____________ Construction

____________ Farm Implement Equipment

____________ Custom Builders

____________ Heating and Air Conditioning

____________ Farm

Describe education and experience needed for your occupational choice. Outline your plans for reaching them. Show the relationship of work experience to these occupations.

What it takes	Plans for reaching my objective
First occupational choice:	
Experience:	
Education:	
Cost:	
Is it worth the sacrifice?	
Other:	

JOB ORIENTATION

ASSIGNMENT SHEET #3 - SKETCHING AND DRAWING WORKSHEET

Survey the local community for employment opportunities related to agribusiness occupations. Make a list of these businesses and the products and service offered to the community.

AGRICULTURE BUSINESS	PRODUCTS AND SERVICES OFFERED TO THE COMMUNITY

JOB ORIENTATION

TEST

I. Match terms associated with agriculture sketching and drawing to thier correct definition.

___A. Art of drawing.

___B. To bring forth or out by design.

___C. To plan mentally and outline.

___D. To spread out and prepare.

___E. An outline of the duties to be performed on a particular job.

___F. Science or art of cultivating the soil, producing crops, raising livestock and all other aspects of preparing these products to move from producer to consumer.

___G. Study of each task that is performed on a job.

___H. An outline or rough draft or plan of any design. A preliminary draft.

___I. Helps people single out facts about themselves in relation to thier career interests.

1. Sketch
2. Draw
3. Draft
4. Agriculture
5. Aptitude Test
6. Job Description
7. Design
8. Layout
9. Job Analysis

II. Select from the list sources to use in finding a job by placing an "X" in the appropriate blank.

___A. Department of Labor

___B. School Placement Bureau

___C. Former Instructor

___D. Former Employees

___E. Carrying a Gun

___F. Want Advertisements

___G. State Employment Service

___H. Letter of Inquiry

___I. Former Employers

___J. Friends & Relatives

III. Select from a list the factors that should be considered when choosing an occupation by placing an "X" in the appropriate blank.

___A. Interest
___B. Hobbies
___C. Salary
___D. Advancement Opportunities
___E. Location
___F. Working Conditions
___G. How big you are
___H. Security for the future
___I. Interpersonal relationships with employee and management.
___J. Safety

IV. Select from a list the expectations an employer has of its employees by placing an "X" in the appropriate blank.

___A. Honesty
___B. Loyalty
___C. Good work habits
___D. Rebate
___E. Cooperation
___F. Good working relationships
___G. Proper use of ability

V. Select from a list the expectations an employee has of its employer by placing an "X" in the appropriate blank.

___A. Financial Compensation
___B. Good working conditions
___C. Security
___D. Recognition of accomplishments
___E. Benefits

VI. Select from a list the steps to take in obtaining a job by placing an "X" in the appropriate blank.

___A. Select your field
___B. Locate job prospects
___C. Prepare a personal resume
___D. Fill out required forms
___E. Drivers license
___F. Schedule an Interview
___G. Interview
___H. Marriage License

VII. List information to be supplied to an employer.

A.

B.

C.

D.

VIII. Match five broad occupational areas of sketching and drawing to the sub areas.

A. Construction

B. Farm Implement Equipment

C. Custom Builders

D. Heating and Air Conditioning

E. Farm

___ 1. Farm Building Contractors

___ 2. Foundation Contractors

___ 3. Plumbing Contractors

___ 4. Electric Contractor

___ 5. Designing New Equipment

___ 6. Redesigning Older Equipment

___ 7. Designing Nonconventional Equipment

___ 8. Designing Custom Parts

___ 9. Layout Plans on Revitalizing Old Equipment

___10. Layout Wiring

___11. Design New Wire Systems

___12. Redesign Old Wire Systems

___13. Design Farm Equipment

___14. Layout Farm Buildings

___15. Layout Farms

___16. Design parts for existing eqiipment

___17. Landscape farms, homes, etc.

___18. Maping

IX. Complete a self information sheet.

X. Complete plan for getting started in a sketching and drawing occupation.

XI. Complete a sketching and drawing worksheet.

JOB ORIENTATION

ANSWERS TO TEST

I. A. 3

B. 2

C. 7

D. 8

E. 6

F. 4

G. 9

H. 1

I. 5

II. "X" should be in each blank except E.

III. "X" should be in each blank except G.

IV. "X" should be in each blank except D.

V. "X" should be in each blank.

VI. "X" should be in each blank except E and H.

VII. A. References

B. School transcript or record

C. List of related experiences

D. Social security number

VIII. 1. A

2. A

3. A

4. A

5. B

6. B

7. C

8. C

9. C

10. D

11. D

12. D

13. E

14. E

15. E

16. E

17. E

18. E

SECTION E

UNIT V

ORTHOGRAPHIC PROJECTION

ORTHOGRAPHIC PROJECTION

TERMINAL OBJECTIVE

After completion of this unit, the student will be able to write the definition of terms related to this unit. This knowledge will be evidenced through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Define terms associated with orthographic projection.

II. Define orthographic projection.

III. Define mechanical drawing.

IV. Define multiview drawing.

V. List the six views normally seen when making an orthographic projection.

VI. List the three views most commonly used in orhtographic projection.

VII. List three rules in projecting points from one view to another view.

VIII. List three basic dimensions of any object.

IX. List three methods used to transfer points from top to end view.

X. Arrange in order, steps used in centering a one-view drawing.

XI. Arrange in order, steps used in centering a two-view drawing.

XII. Arrange in order, steps used in centering a three-view drawing.

ORTHOGRAPHIC PROJECTION

SUGGESTED ACTIVITIES

I. Instructor:

  A. Provide students with objective sheets.

  B. Provide students with information and assignment sheets.

  C. Make transparencies.

  D. Discuss terminal and specific objectives.

  E. Discuss information sheets.

  F. Demonstrate and discuss procedures outlined in assignment sheets.

  G. Give test.

II. Student:

  A. Read objective sheets.

  B. Study information sheets.

  C. Demonstrate the ability to accomplish the procedures outlined in the assignment sheets.

  D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

  A. Objective sheet

  B. Information sheet

  C. Transparency masters

    1. TM 1 - Picture Plane Projection

    2. TM 2 - Picture Plane Projection

    3. TM 3 - Picture Plane Projection

    4. TM 4 - One-View Drawings

5. TM 5 - Two-View Drawings
6. TM 6 - Three-View Drawings
7. TM 7 - Methods of Transferring Dimensions
8. TM 8 - Centering a One-View Drawing
9. TM 9 - Centering a Two-View Drawing
10. TM 10 - Centering a Three-View Drawing

D. Assignment sheets

1. Assignment sheet #1 - Orthographic Drawing
2. Assignment sheet #2 - Orthographic Drawing
3. Assignment sheet #3 - Orthographic Drawing
4. Assignment sheet #4 - Orthographic Drawing
5. Assignment sheet #5 - Orthographic Drawing

E. Answers to assignment sheets

F. Test

G. Answers to test

II. References:

A. Hartman, William J., Basic Drafting, Tulsa, Oklahoma, Oklahoma State Board of Vocational and Technical Education, 1972.

B. Hornung, William J., Architectural Drafting, Englewood Cliffs, N.J., Prentice Hall Inc., 1971.

C. Walker, John R., Exploring Drafting, South Holland, Illinois, Goodheart Wilcox Co. Inc., 1972.

ORHTOGRAPHIC PROJECTION

INFORMATION SHEET

I. Terms and definitions:

A. FRONTAL VIEW - The front view.

B. PROFILE VIEW - The side view.

C. HORIZONTAL VIEW - The top view.

D. GRAPHICS - A drawing to represent an object.

E. VISUALIZE - Form a mental picture or image.

F. HEIGHT - The distance from bottom to top.

G. WIDTH - The distance from one side to the other side.

H. DEPTH - The distance from front to back.

I. PROJECTION LINES - The lines used to extend from one view to the next view.

J. LINE PRECIDENCE - The lines that are more important to show than others.

K. TRUE SIZE - Of its actual dimensions.

L.. ADJACENT - Next to or beside.

M. TRANSFER - Take from one point or position and put in another.

N. COINCIDE - To match up identically

II. Defintion of orthographic projection - The method of representing the exact form of an object in two or more views on planes, generally at right angles to each other.

III. When a drawing is made with the aid of instruments, it is called a mechanical drawing.

IV. A multiview drawing is when more than one view is required to give shape description of the object being drawn.

INFORMATION SHEET

V. The six views normally seen when making an orthographic projection.

A. Rear view TM 1

B. Left side view

C. Front view

D. Right side view

E. Bottom view

F. Top view

VI. The three views most commonly used in orthographic projection.

A. Top TM 2-6

B. Front

C. Right side

VII. Three rules in projecting points from one view to another. (TM1)

A. Top and front have same width.

B. Top and sides have same depth.

C. Front and sides have same height.

VIII. Three basic dimensions of any object.

A. Width TM 1

B. Height

C. Depth

IX. The three methods used to transfer points from top to end view are:

A. 45° miter projection TM 7

B. Divider transfer

C. Sealer transfer

INFORMATION SHEET

X. The steps used in centering a one-view drawing. (TM 8)

- A. Find center of working space.
- B. Put half the length to the right and half the length to the left of the center of working space.
- C. Put half the width above and half the width below the center of working space.
- D. Box in the view.

XI. The steps used in centering a two-view drawing. (TM 9)

- A. Determine overall dimensions of the object.
- B. Determine best direction to lay the object.
- C. Allow adequate space between views and add the dimension of the two views to the 1" space dimension.
- D. Subtract that dimension from the overall dimension of the working surface and take one half of it; this will be the distance to measure in from the edge of the working space.
- E. To center the drawing in the other direction, subtract the views dimensions from the working space and take half of it; this will be the distance to measure in from the edge of the working surface.

XII. The steps used in centering a three-view drawing. (TM 10)

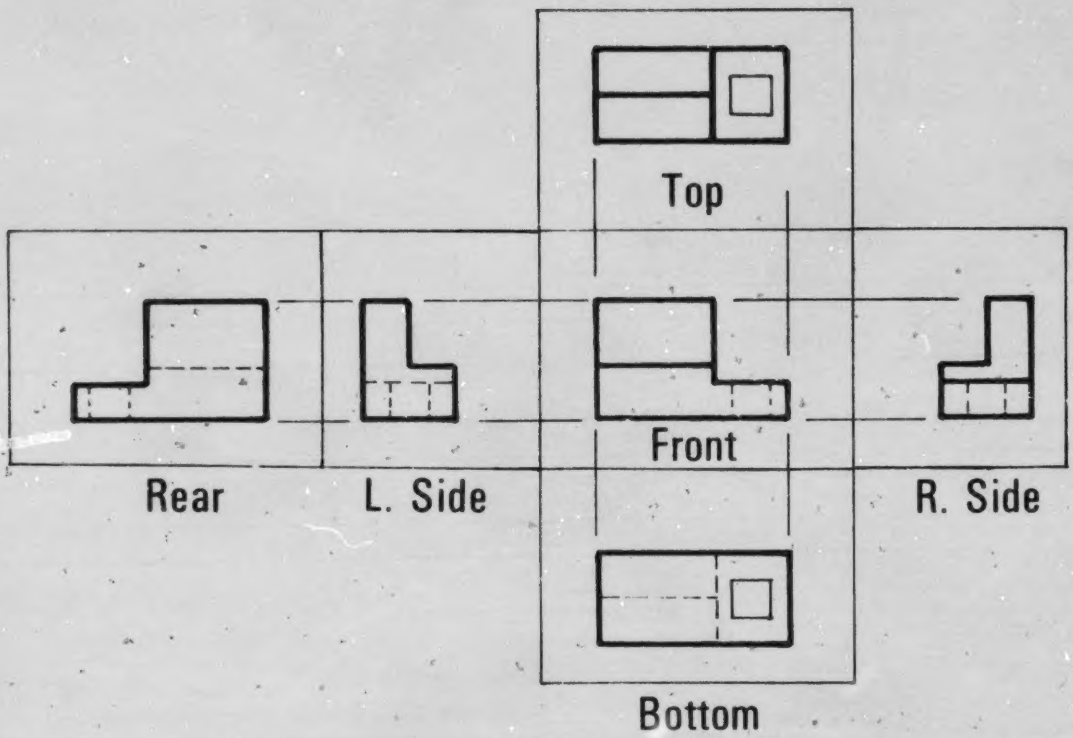
- A. Determime overall height, width and depth of the object.
- B. Determine best views to use in illustrating the object.
- C. Allow space between views and add up horizontal run of dimensions.
- D. Subtract this dimension from the horizontal working space and divide in half; this will be the dimension to measure in from the left.
- E. Allow space between views and add up the vertical run of dimensions.

INFORMATION SHEET

F. Subtract this dimension from the vertical working space and divide in half; this will be the dimension to measure up from the bottom.

G. Layout dimensions of the views and box in the views.

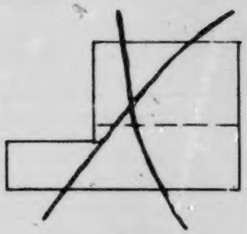
Picture Plane Projection


Top
Rear
L. Side
Front
R. Side
Bottom

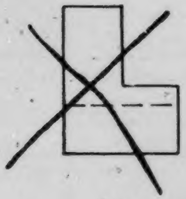
The six planes are layed on a flat plane as on a drawing surface.

Picture Plane Projection

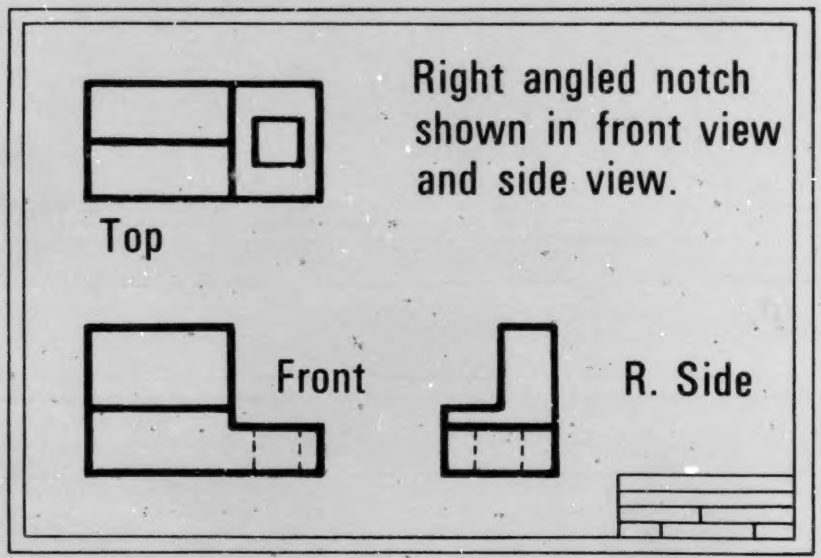
Eliminate Views Not Needed



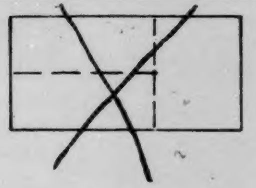
Rear



L. Side

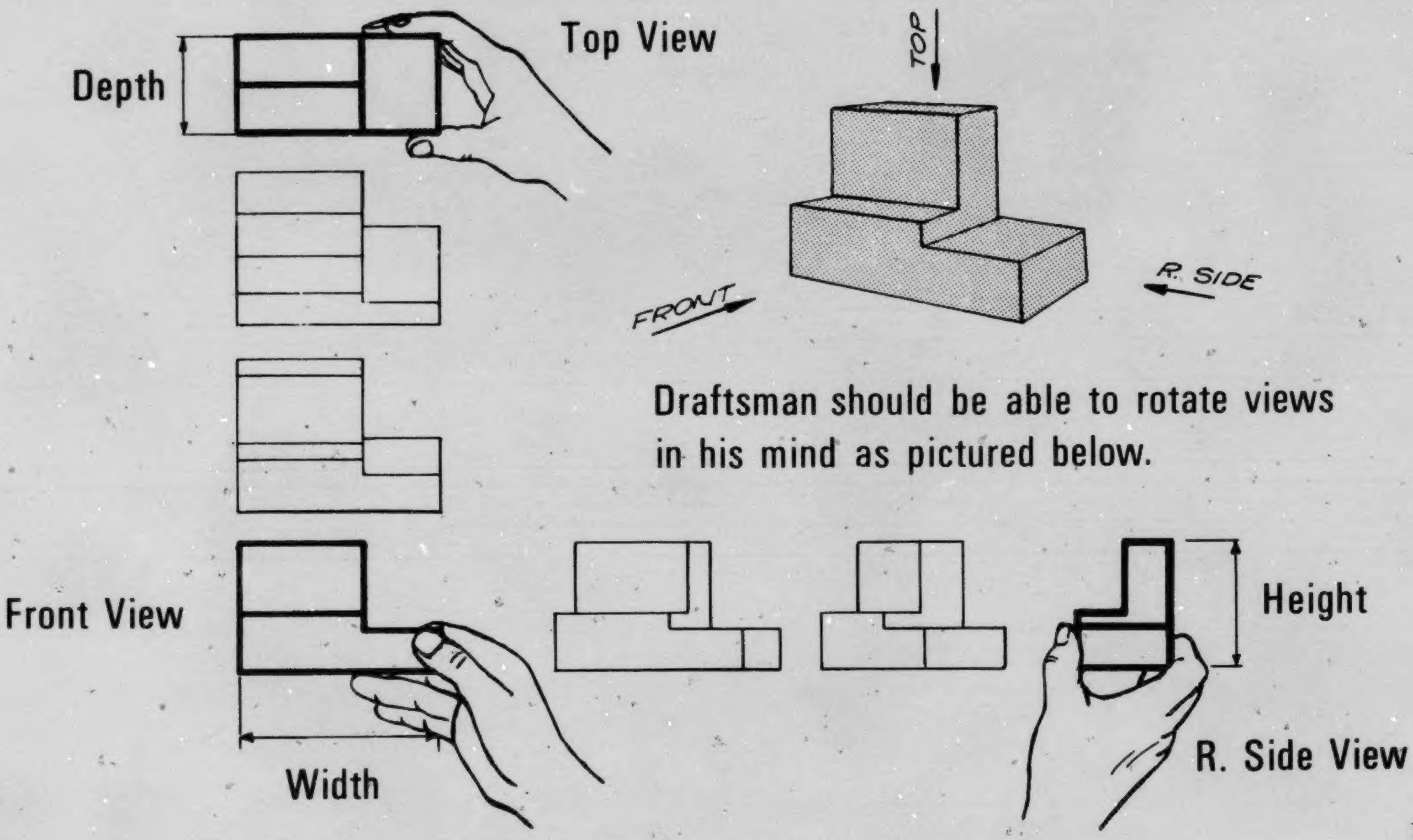


Right angled notch shown in front view and side view.



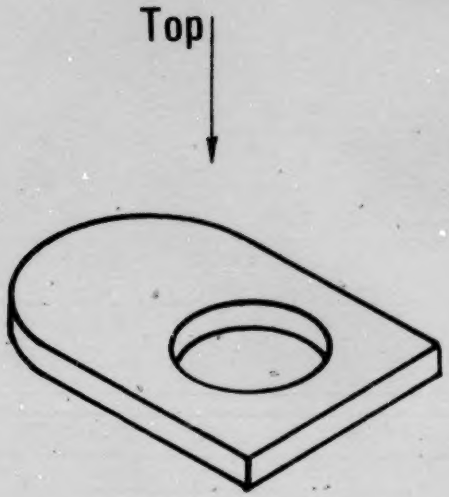
Bottom

Picture Plane Projection

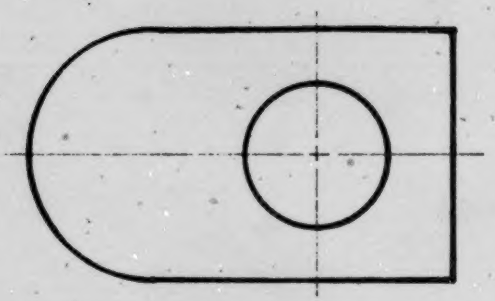

Depth
Top View
TOP
R. SIDE
FRONT
Front View
Width
Height
R. Side View

Draftsman should be able to rotate views in his mind as pictured below.

One-View Drawings

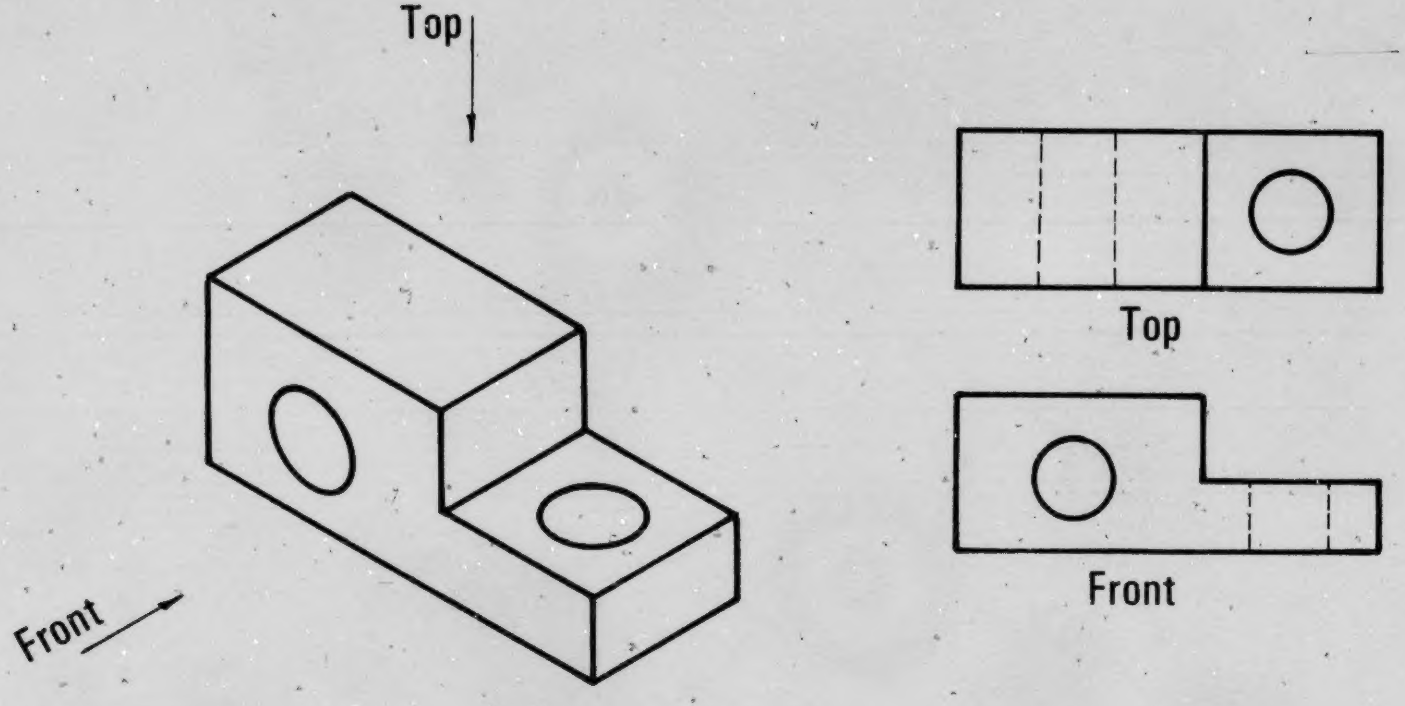


Objects with very little thickness require only one view.



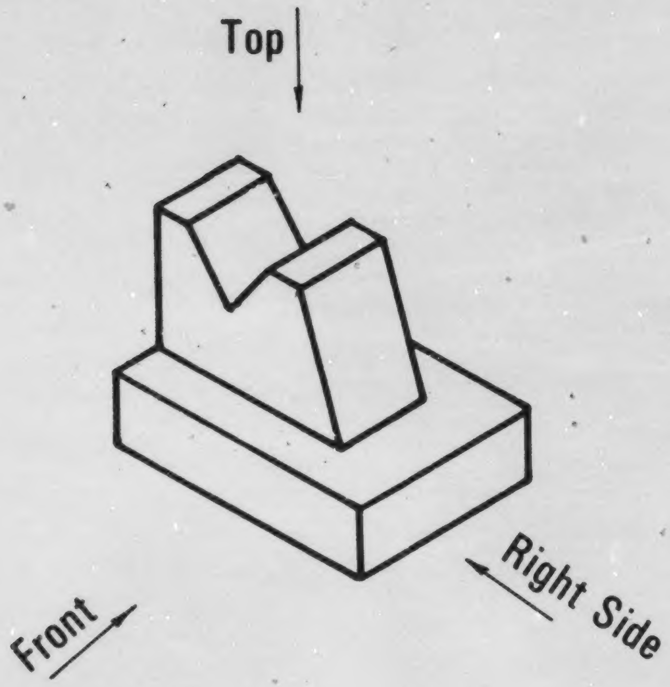
Top View

Two-View Drawings

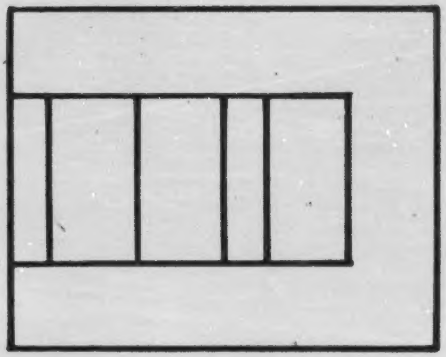

Top
Front
Top
Front

Some objects require only two views.

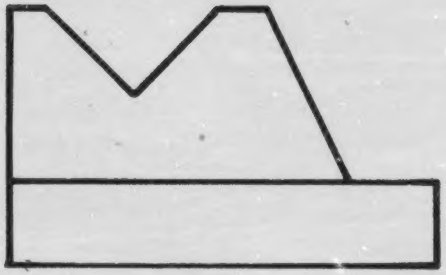
Three-View Drawings


Top
Front
Right Side

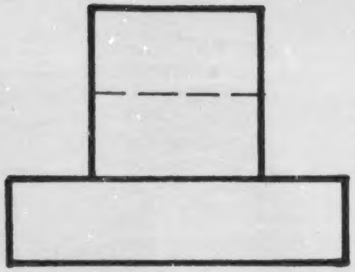
Some objects require three views to describe its shape.



Top View

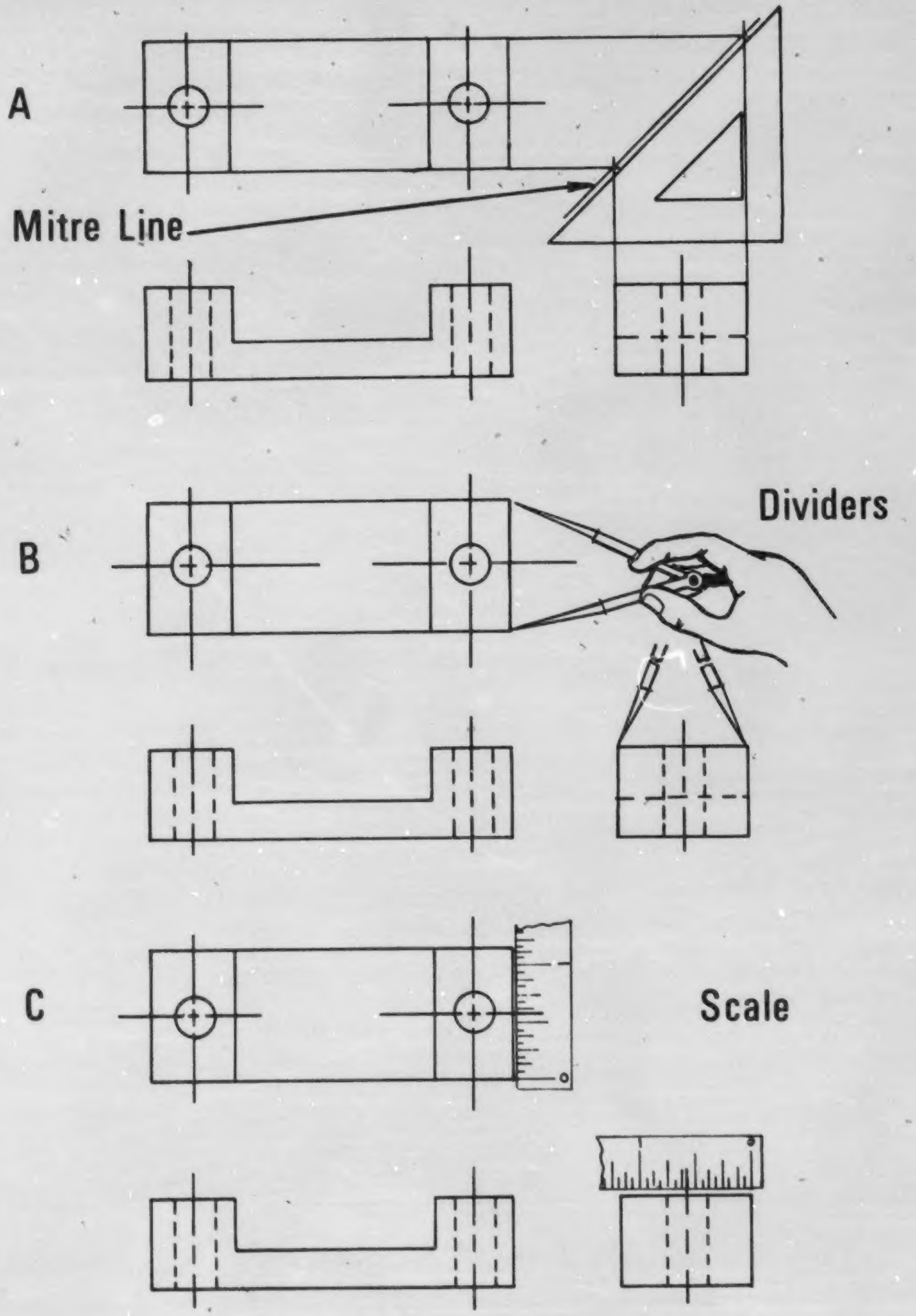


Front

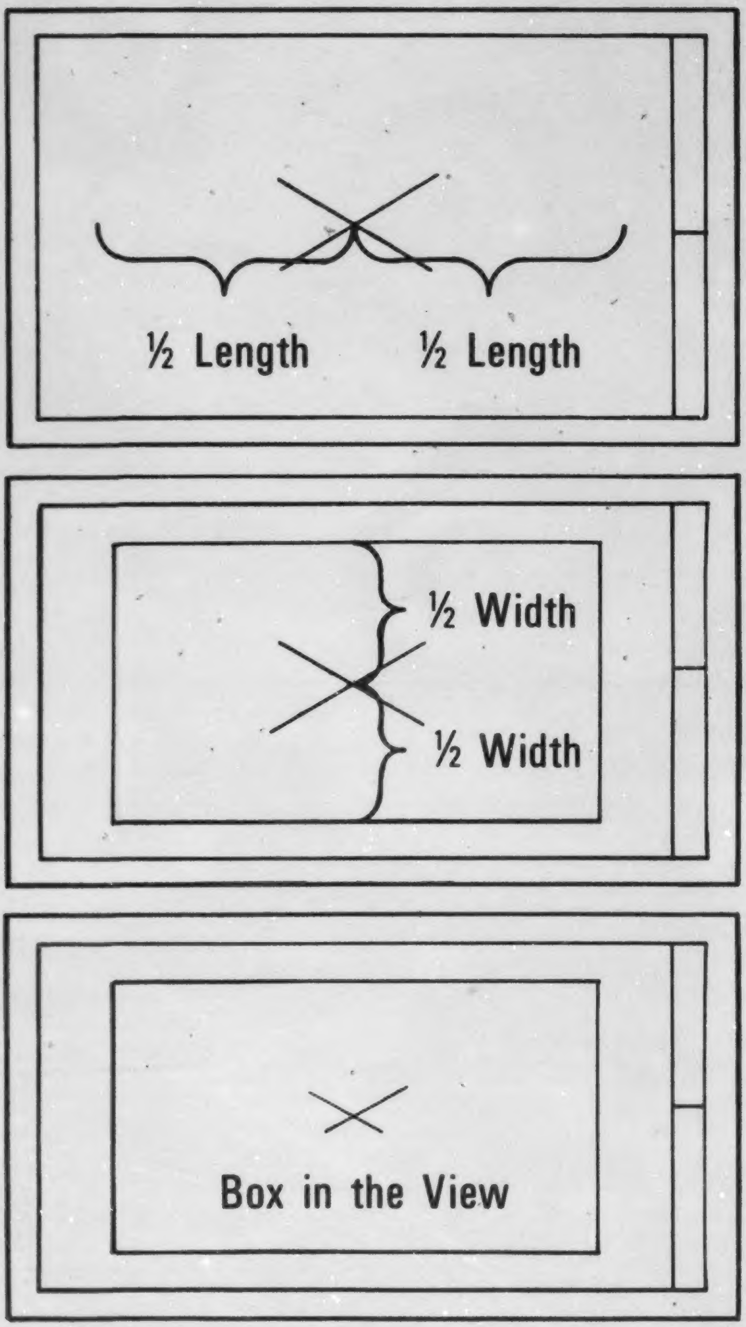


Right Side

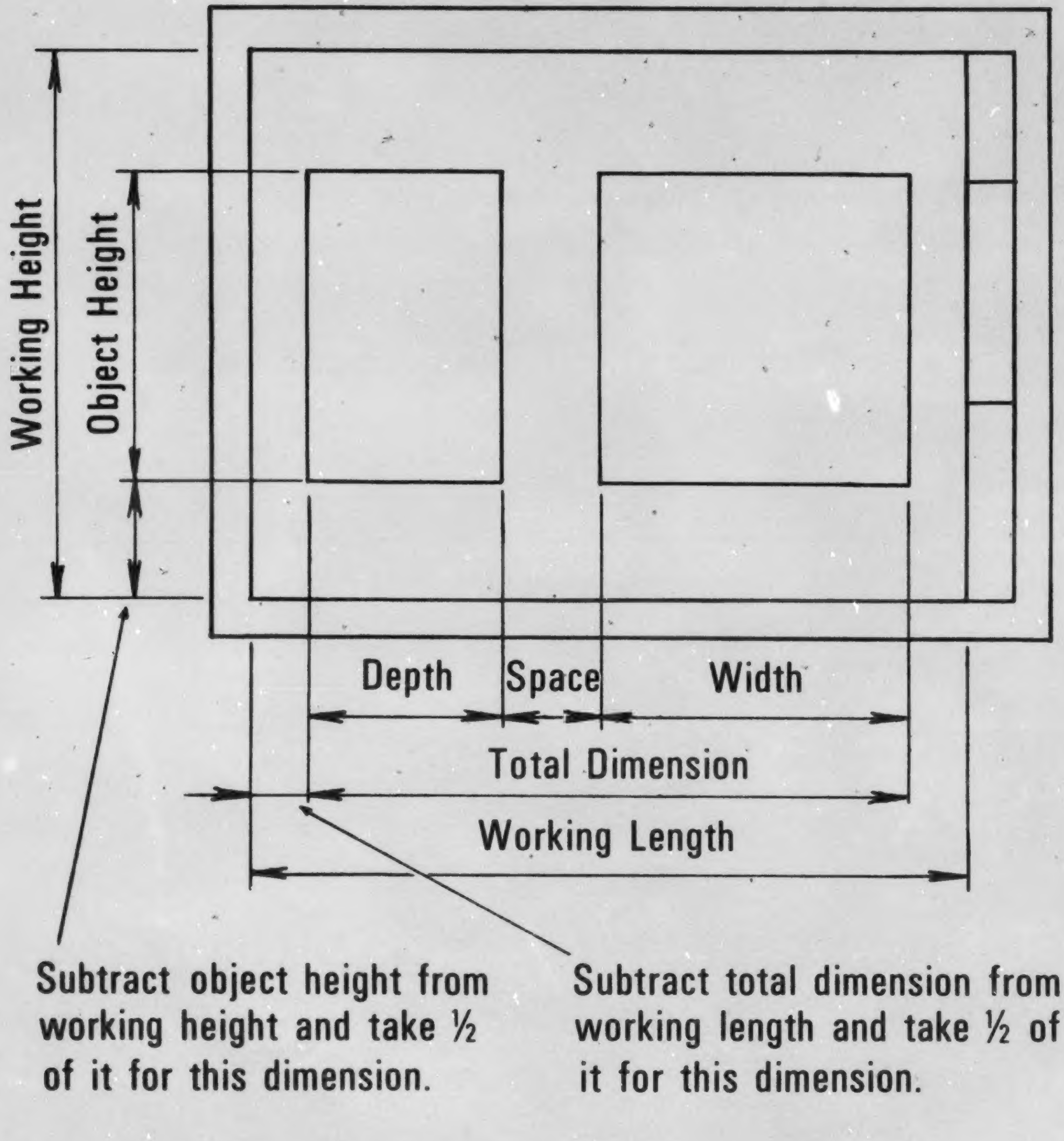
Methods of Transferring Dimensions


A
Mitre Line
B
Dividers
C
Scale

Centering a One-View Drawing


½ Length
½ Length
½ Width
½ Width
Box in the View

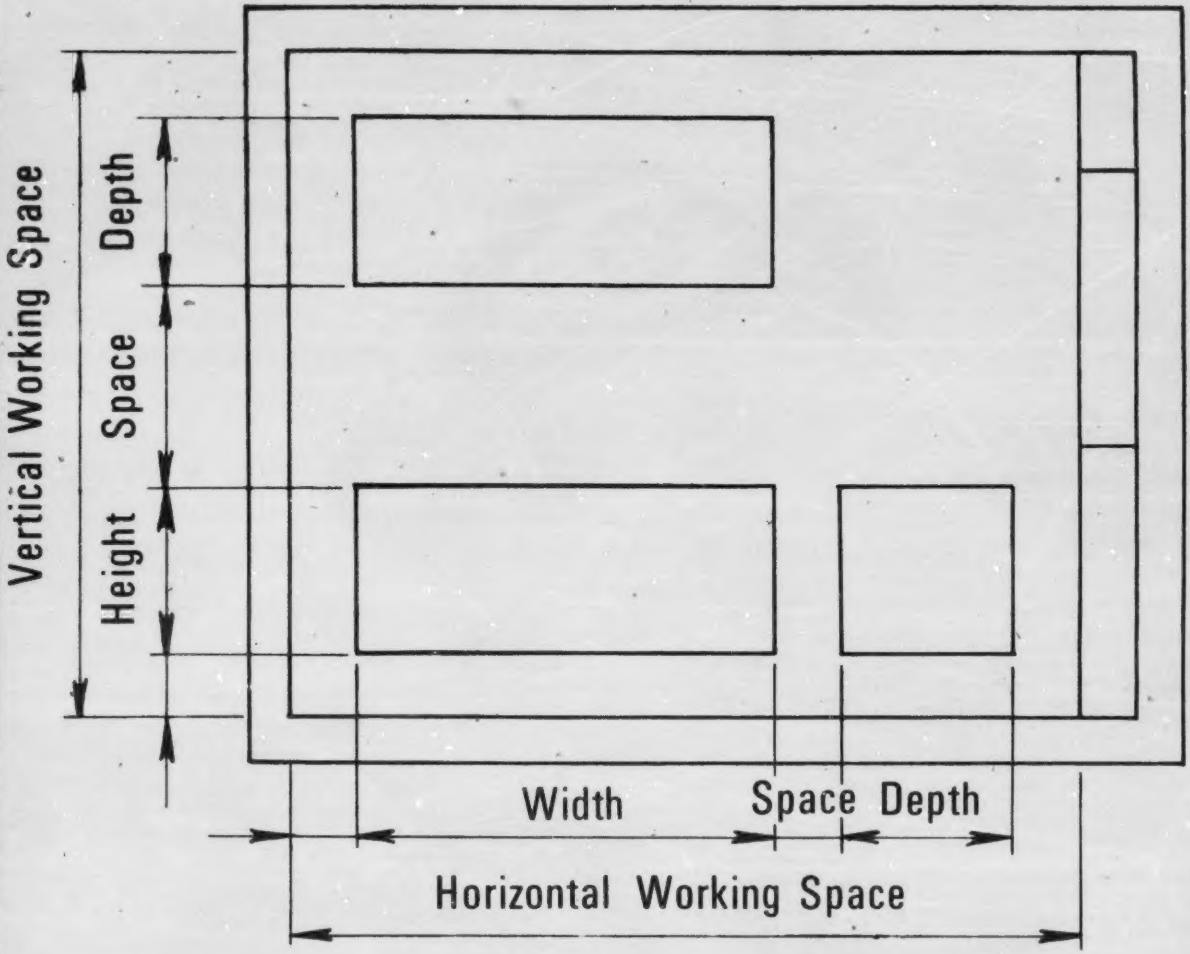
Centering a Two-View Drawing


Working Height
Object Height
Depth
Space
Width
Total Dimension
Working Length

Subtract object height from working height and take ½ of it for this dimension.

Subtract total dimension from working length and take ½ of it for this dimension.

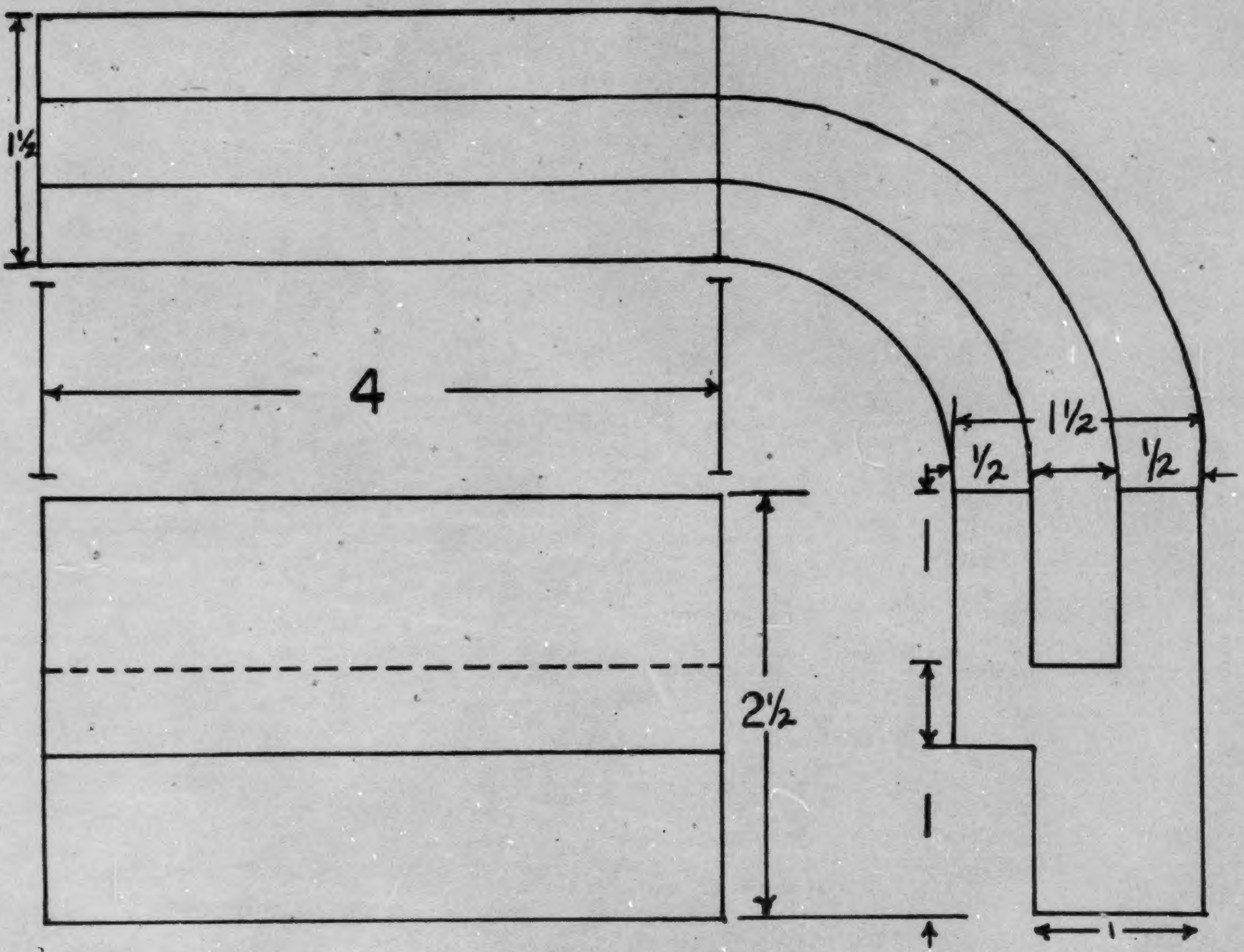
Centering a Three-View Drawing


Vertical Working Space
Depth
Space
Height
Width
Space
Depth
Horizontal Working Space

ORTHOGRAPHIC PROJECTION

ASSIGNMENT SHEET #1 - ORTHOGRAPHIC DRAWING

Instructions: Draw to the best of your ability the orthographic drawing on the next page.


1½
4
2½
1½
½
½
1
1
1

130

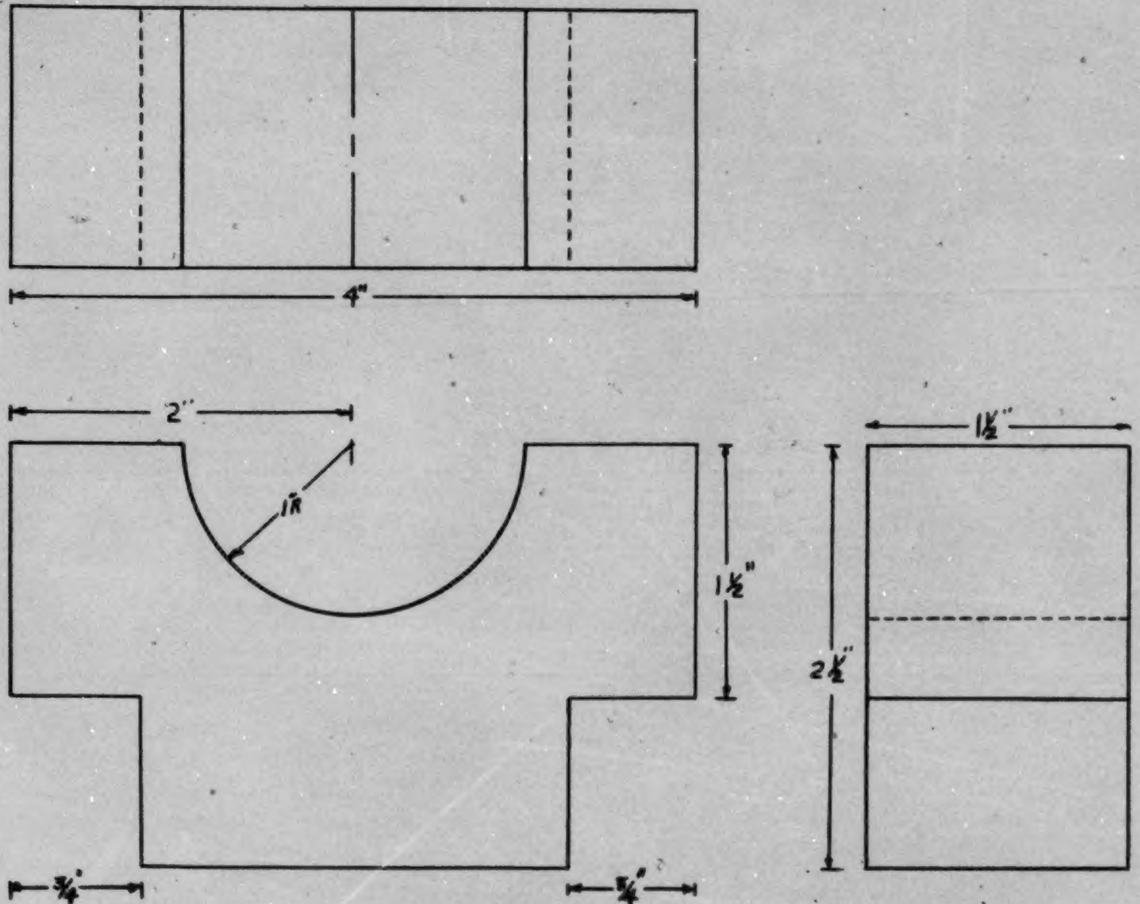
131

NAME	ORTH. PROJECTION	SCALE: 1" = 1"	DATE

ORHTOGRAPHIC PROJECTION

ASSIGNMENT SHEET #2 - ORTHOGRAPHIC DRAWING

Instructions: Draw to the best of your ability the orthographic drawing on the next page.


4"
2"
1R
1½"
1½"
2½"
¾"
¾"

NAME

ORTH. PROJECTION

SCALE 1"=1"

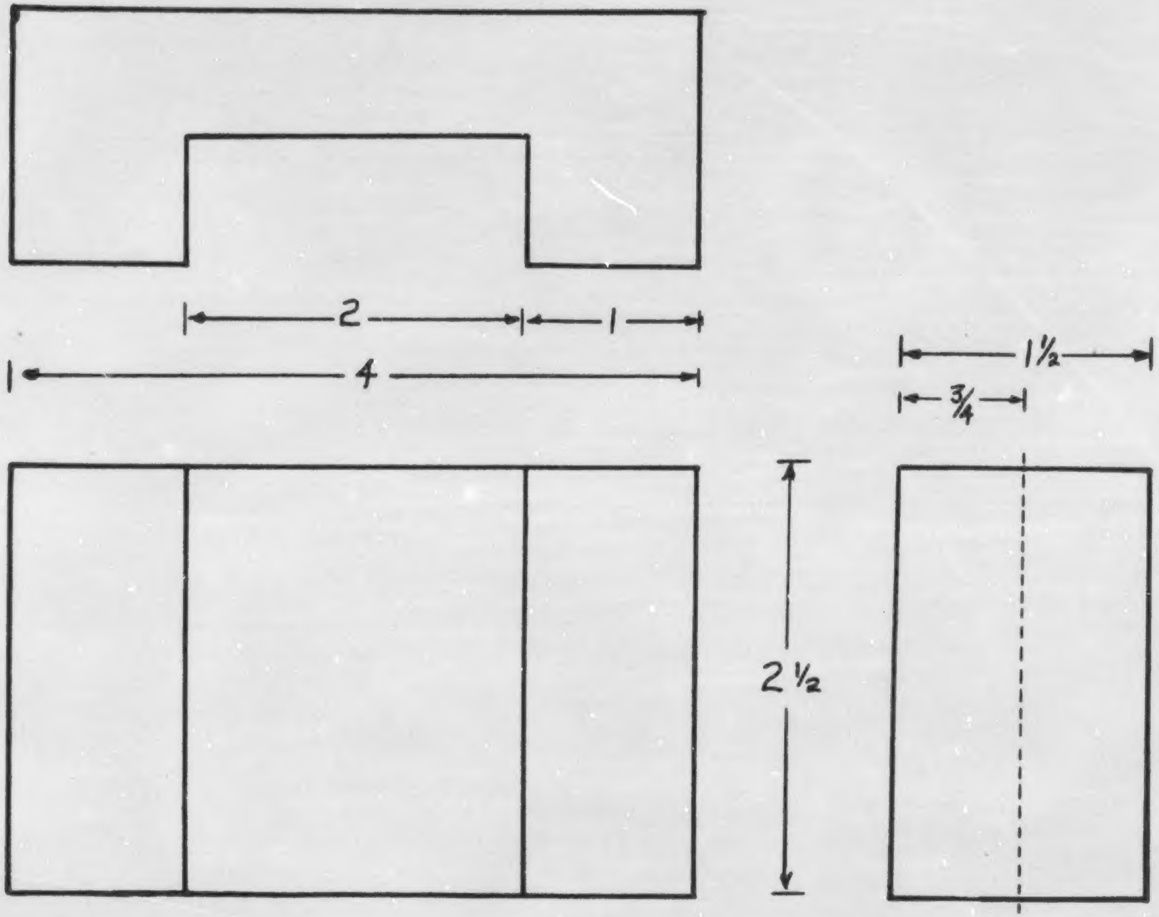
DATE

ORHTOGRAPHIC PROJECTION

ASSIGNMENT SHEET #3 - ORHTOGRAPHIC DRAWING

Instructions: Draw to the best of your ability the orthographic drawing on the next page.

34-E



136

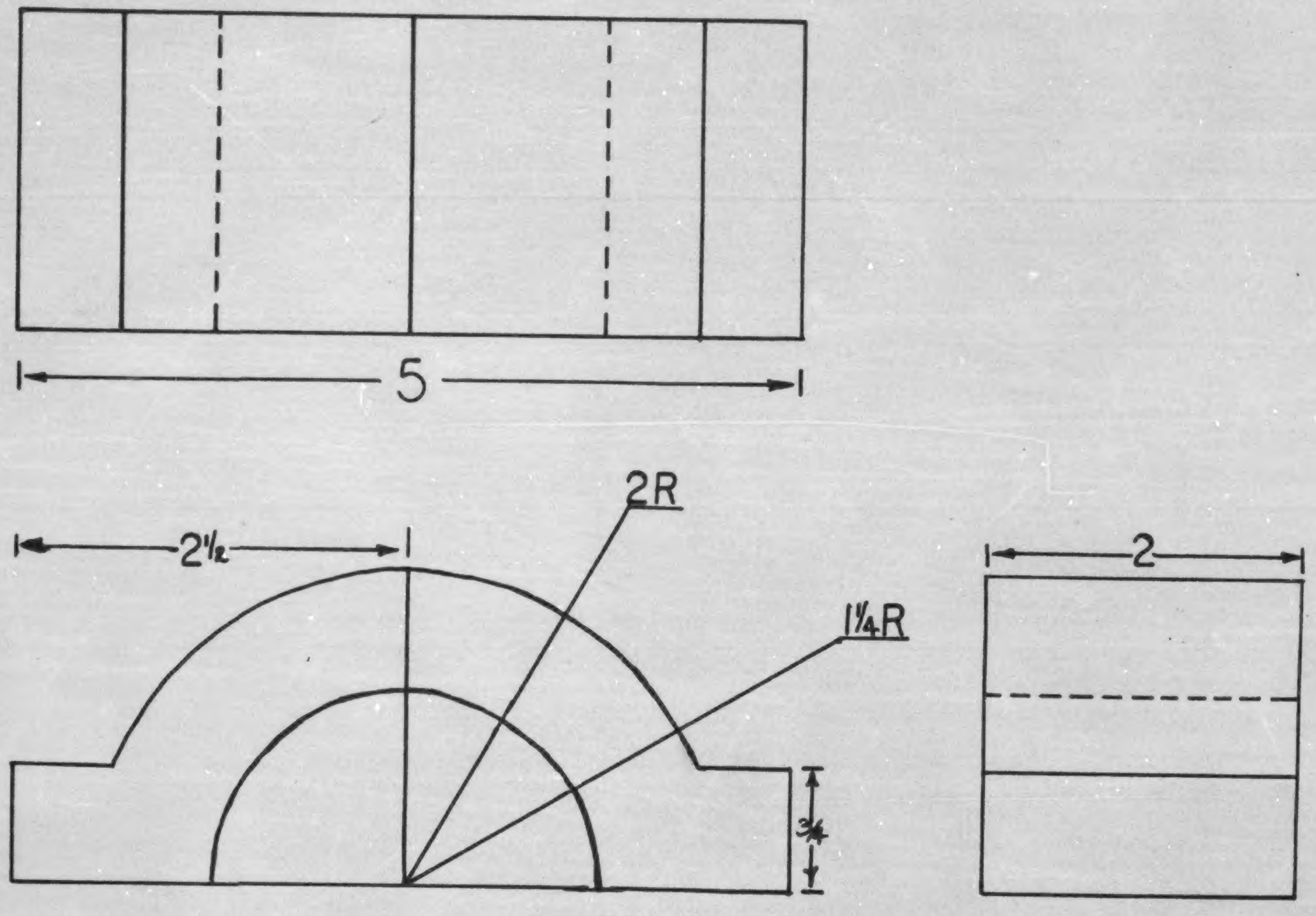
137

NAME	ORTH. PROJECTION	SCALE 1"=1"	DATE

ORTHOGRAPHIC PROJECTION

ASSIGNMENT SHEET #4 - ORHTOGRAPHIC DRAWING

Instructions: Draw to the best of your ability the orthographic drawing on the next page.


5
2½
2R
1¼R
¾
2

139

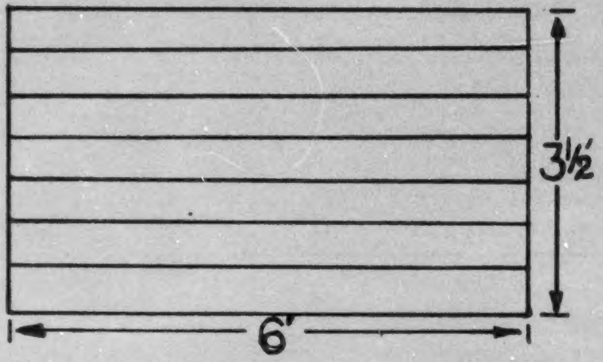
140

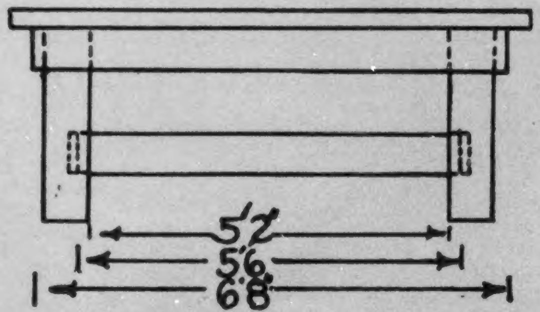
NAME	ORTH PROJECTION	1" = 1"	DATE

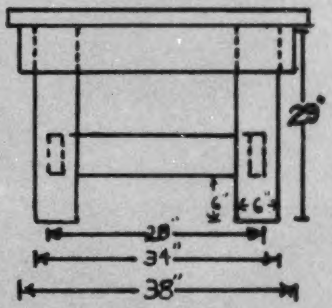
ORHTOGRAPHIC PROJECTION

ASSIGNMENT SHEET #5 - ORHTOGRAPHIC DRAWING

Instructions: Draw to the best of your ability the orthographic drawing on the next page.






29"
6"
6"
28"
34"
38"

NAME TABLE SCALE ½"=1' DATE

ORTHOGRAPHIC PROJECTION

ANSWERS TO ASSIGNMENT SHEETS

Assignment sheet #1

To be evaluated by the instructor

Assignment sheet #2

To be evaluated by the instructor

Assignment sheet #3

To be evaluated by the instructor

Assignment sheet #4

To be evaluated by the instructor

Assignment sheet #5

To be evaluated by the instructor

ORTHOGRAPHIC PROJECTION

TEST

I. Define the following terms:

A. Frontal

B. Profile

C. Horizontal

D. Graphics

E. Visualize

F. Height

G. Width

H. Depth

I. Projection lines

J. Line precidence

K. True size

L. Adjacent

M. Transfer

N. Coincide

II. Define orthographic projection.

III. Define mechanical drawing.

IV. Define multiview drawing.

V. List the six views normally seen when making an orthographic projection.

A.

B.

C.

D.

E.

F.

VI. List the three views most commonly used in an orthographic projection.

A.

B.

C.

VII. List the three rules in projecting points from one view to another view.

A.

B.

C.

VIII. List three basic dimensions of any object.

A.

B.

C.

IX. List the three methods used to transfer points from top to end view.

A.

B.

C.

X. List in order the steps used in centering a one-view drawing.

A.

B.

C.

D.

XI. List in order steps used in centering a two-view drawing.

A.

B.

C.

D.

E.

XII. List in order the steps used in centering a three-view drawing.

A.

B.

C.

D.

E.

F.

G.

XIII. Hand in assignment sheet #1.

XIV. Hand in assignment sheet #2.

XV. Hand in assignment sheet #3.

XVI. Hand in assignment sheet #4.

XVII. Hand in assignment sheet #5.

ORTHOGRAPHIC PROJECTION

ANSWERS TO TEST

I. A. The front view.

B. The side view.

C. The top view.

D. A drawing to represent an object.

E. Form a mental picture or image.

F. The distance from bottom to top.

G. The distance from one side to the other.

H. The distance from front to back.

I. The lines used to extend from one view to the next view.

J. The lines that are more important to show than others.

K. Of its actual dimensions.

L. Next to or besides.

M. Take from one point or position and put in another.

N. To match up identically.

II. The method representing the exact form of an object in two or more views on planes, generally at right angles to each other.

III. When a drawing is made with the aid of instruments, it is called a mechanical drawing.

IV. More than one view is required to give a shape description of the object being drawn.

V. A. Rear view

B. Left side view

C. Front view

D. Right side view

E. Bottom view

F. Top view

VI. A. Top

B. Front

C. Right side

VII. A. Top and front have same width

B. Top and sides have same depth

C. Front and sides have same height

VIII. A. Width

B. Height

C. Depth

IX. A. 45° miter projection

B. Divider transfer

C. Scale transfer

X. A. Find center of working space.

B. Put half the length to the right and half the length to the left of the center of the working space.

C. Put half the width above and half the width below the center of the working space.

D. Box in the view.

XI. A. Determine overall dimensions of the object.

B. Determine best direction to lay the object.

C. Allow adequate space between views and add the dimension of the top views to the 1" space dimension.

D. Subtract that dimension from the overall dimension of the working surface and take one half of it; this will be the distance to measure in from the edge of the working space.

E. To center the drawing in the other direction, subtract the views dimensions from the working space and take half of it; this will be the distance to measure in from the edge of the working surface.

XII. A. Determine overall height, width and depth of the object.

B. Determine best views to use in illustrating the object.

C. Allow space between views and add up horizontal run of dimensions.

D. Subtract this dimension from the horizontal working space and divide in half; this will be dimension to measure in from the left.

E. Allow space between views and add up the vertical run of dimensions.

F. Subtract this dimension from the vertical working space and divide in half; this will be the dimension to measure up from the bottom.

G. Layout dimensions of the views and box in the views.

XIII. To be evaluated by the instructor.

XIV. To be evaluated by the instructor.

XV. To be evaluated by the instructor.

XVI. To be evaluated by the instructor.

XVII. To be evaluated by the instructor.

SECTION F

UNIT VI

OBLIQUE DRAWINGS

OBLIQUE DRAWINGS

TERMINAL OBJECTIVE

After completion of this unit, the student should be able to identify the basic types of picture drawings and be familiar with terms and definitions related to oblique drawings. The student should be able to evidence this ability to draw oblique drawings through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Match terms associated with oblique drawings to the correct definition.

II. List three types of pictorial drawings.

III. Draw four positions used on oblique drawings.

IV. List ten rules to follow when constructing oblique drawings.

V. Name two methods of dimensioning an oblique drawing.

VI. Name seven rules to use in dimensioning an oblique drawing.

VII. List three angles in which oblique drawings are displayed off the main axis.

OBLIQUE DRAWINGS

SUGGESTED ACTIVITIES

I. Instructor:

   A. Provide students with objective sheet.

   B. Provide students with information sheets and assignment sheets.

   C. Make transparencies.

   D. Discuss terminal and specific objectives.

   E. Discuss information sheets.

   F. Demonstrate and discuss procedures outlined in assignment sheets.

   G. Give test.

II. Student:

   A. Read objective sheet.

   B. Study information sheet.

   C. Demonstrate the ability to accomplish the procedures outlined in the assignment sheets.

   D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

   A. Objective sheet

   B. Information sheet

   C. Transparency masters

      1. TM 1 - Types of Pictorials

      2. TM 2 - Positions of Oblique Axis

      3. TM 3 - Common Mistakes on Oblique Drawings

      4. TM 4 - Common Mistakes on Oblique Drawings

5. TM 5 - Centering an Oblique

6. TM 6 - Oblique Circles and Arcs

D. Assignment sheets

1. Assignment sheet #1 - Measuring an Oblique Drawing

2. Assignment sheet #2 - Centering an Oblique Drawing

3. Assignment sheet #3 - Draw Oblique Circles

4. Assignment sheet #4 - Drawing a Block

5. Assignment sheet #5 - Drawing a Block With Hidden Lines

6. Assignment sheet #6 - Drawing a Block With a Circle

7. Assignment sheet #7 - Drawing a Block With a Circle and Hidden Lines

8. Assignment sheet #8 - Drawing a Block With a Ledge and Hole

E. Answers to assignment sheets

F. Test

G. Answers to test

II. References:

A. Giesecke, Mitchell, Hill, Spencer, Technical Drawings, New York, New York, MacMillan Co., 1975.

B. Hornung, W.J., Architectural Drafting, Englewood Cliffs, New Jersey, Prentice Hall Inc., 1971.

C. Ayres. R., Drafting, Stillwater, Oklahoma, State Department of Vocational and Technical Education, 1972.

OBLIQUE DRAWINGS

INFORMATION SHEET

I. Terms and definitions:

A. PERSPECTIVE - Picturing an object as it appears to the eye using vanishing points.

B. OBLIQUE - A type of pictorial drawing with front plane horizontal and the other two at an angle to the front.

C. ISOMETRIC - A type of picture drawing with each of the three planes on an equal axis to each other.

D. FORESHORTENED - To appear shorter to the eye than it actually is.

E. AXIS LINES - The lines used to represent where surfaces come together.

F. PROJECTION - To extend from one point to another.

G. OBLIQUE LINES - The lines that run parallel with one of the oblique axis lines.

H. NON-OBLIQUE LINES - The lines that do not run parallel to one of the oblique axis lines.

I. ELLIPSE - A circle that has been foreshortened and has a major and minor circle diameter.

J. ILLUSTRATION - A graphic representation.

II. Types of pictorial drawings. Refer to TM 1.

A. Oblique

B. Isometric

C. Perspective

III. Four positions used on oblique drawings. Refer to TM 2.

A. Up and to right

B. Up and to left

C. Down and to right

D. Down and to left

INFORMATION SHEET

IV. Rules to follow when constructing oblique drawings. TM 4.

A. All measurements must be made parallel to the main axis edges of the oblique axis lines. TM 3.

B. Angles are measured by coordinate offsets.

C. Hidden lines may be a problem and in some cases should be omitted. TM 4.

D. Drawings should be centered.TM 5.

E. Use the approximate ellipse method or templates if available on circles that cannot be drawn as regular circles.

F. Box in circles before constructing its arcs.TM 6.

G. Face contour toward the front where they appear in true size.

H. Long objects should be drawn with the long axis perpendicular to the line of sight.

I. Keep all arcs and line tangent to each other.

J. Include the rear ellipse of a hole if it is visible.

V. Two methods of dimensioning oblique drawings.

A. Unidirectional

B. Aligned

VI. Rules used in dimensioning an oblique drawing.

A. Dimensions should be put in by the unidirectional or aligned method.

B. Use guidelines.

C. Dimensions and extension lines should be parallel to dimensioned plane.

D. Keep dimension off objects.

E. Dimensions should be made on visible surfaces.

F. Holes should be dimensioned with notes and leaders.

G. Dimension lines should be kept even and uniform.

INFORMATION SHEET

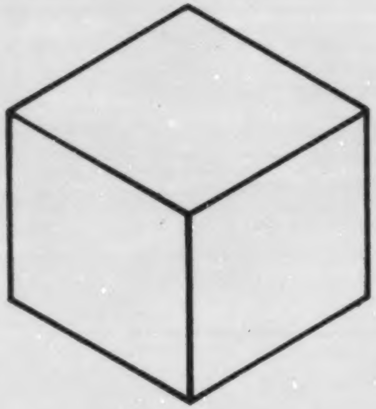
VII. Angles used to display oblique drawings.

A. 30°

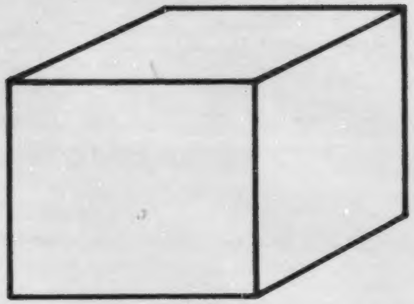
B. 45°

C. 60°

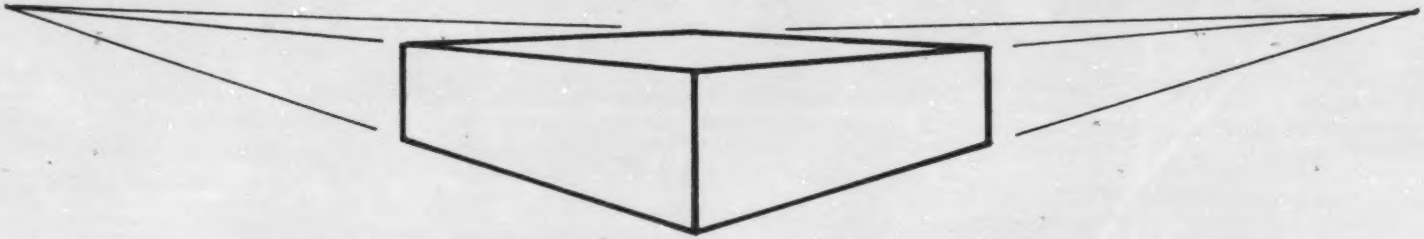
Types of Pictorials



Isometric



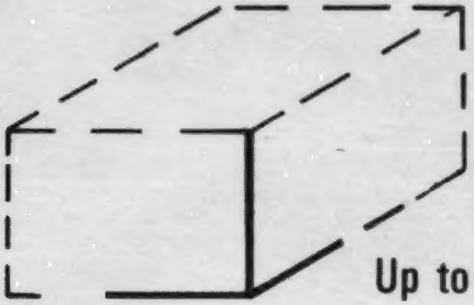
Oblique



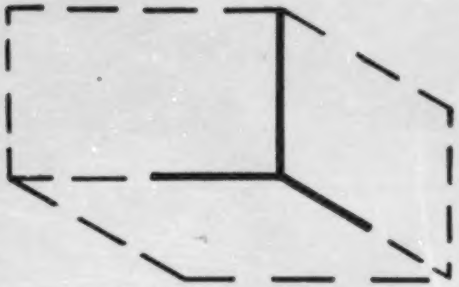
Perspective

Vanishing Point
Vanishing Point

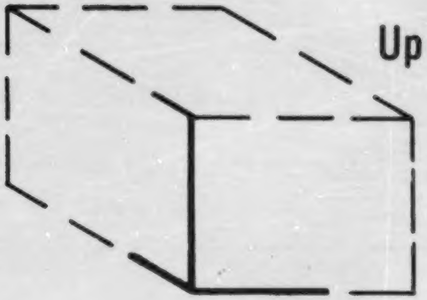
Positions of Oblique Axis



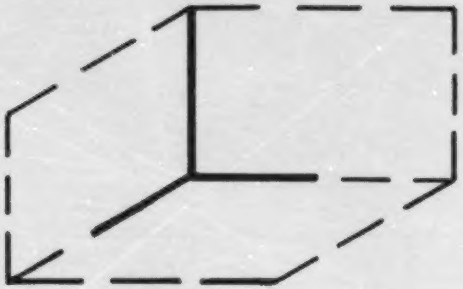
Up to Right



Down to Right



Up to Left

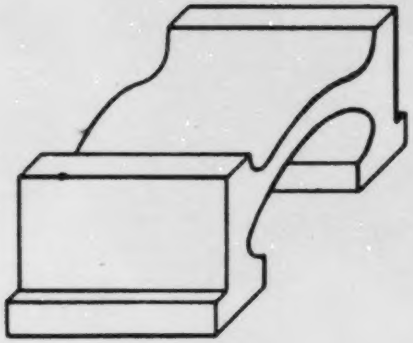


Down to Left

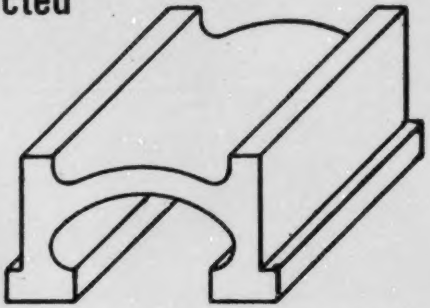
Depth angle can be at any angle but usually 30°, 60°, or 45°.

Common Mistakes on Oblique Drawings

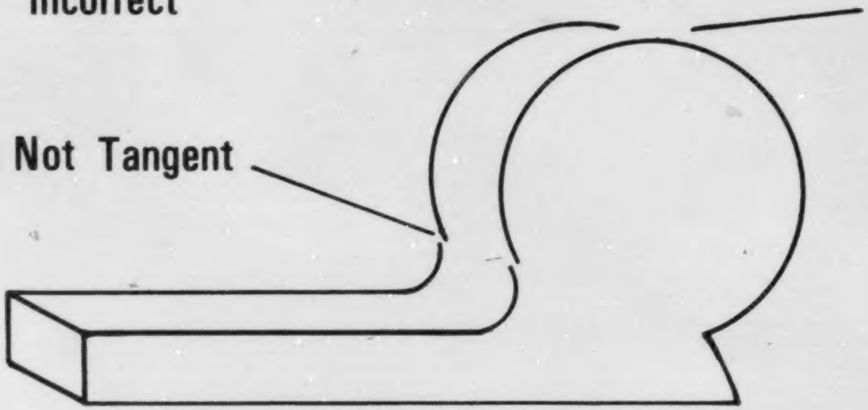
Wrong Axis Selected



Incorrect



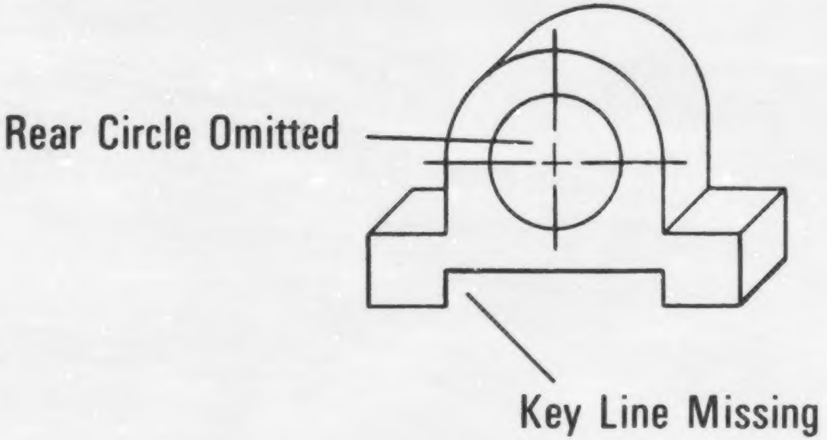
Correct

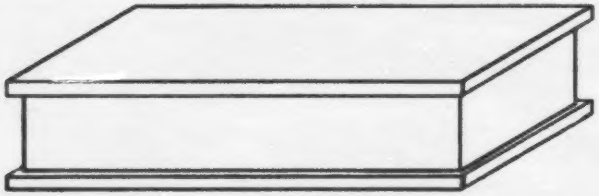


Tangent Lines Omitted

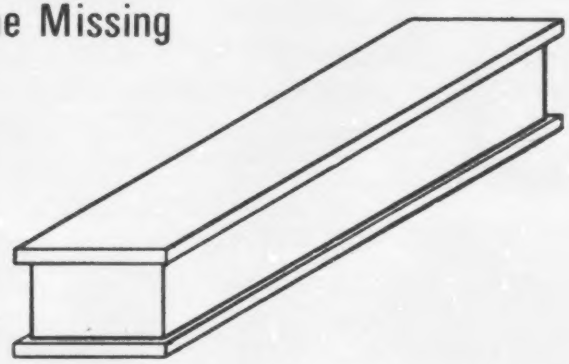
Arcs Not Tangent

Common Mistakes on Oblique Drawings


Rear Circle Omitted
Key Line Missing

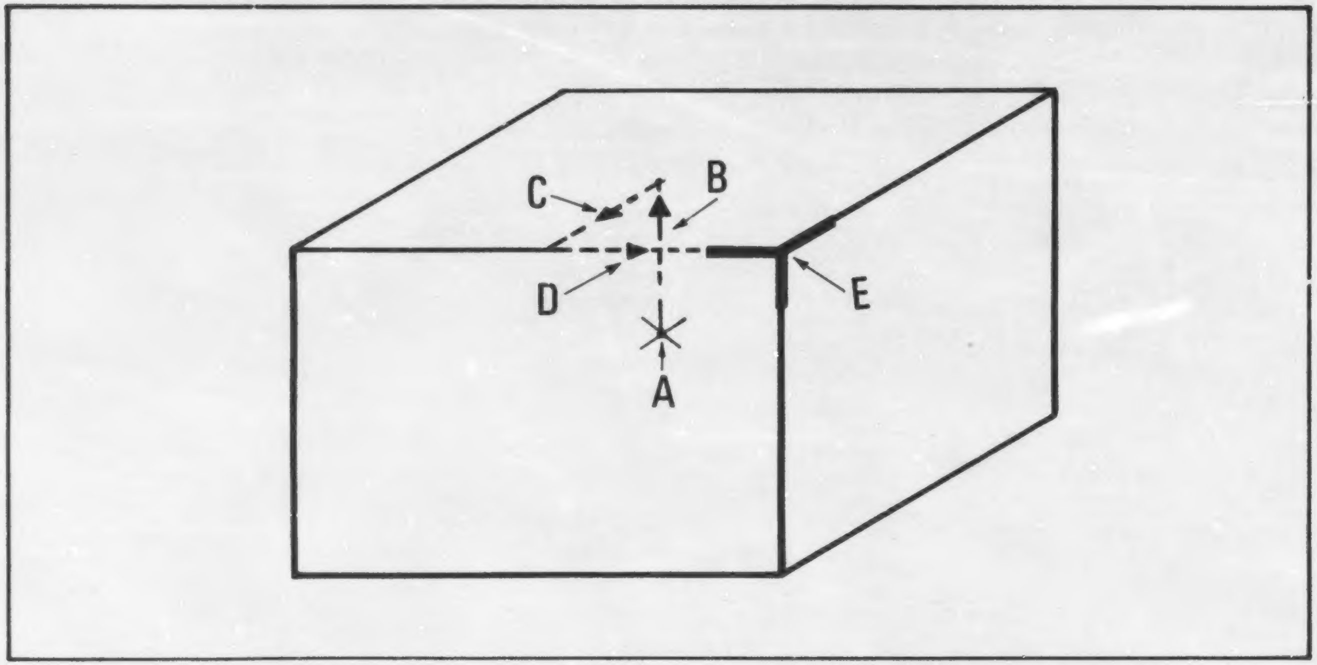


Correct



Incorrect

Centering an Oblique



A. Find the center of the paper.

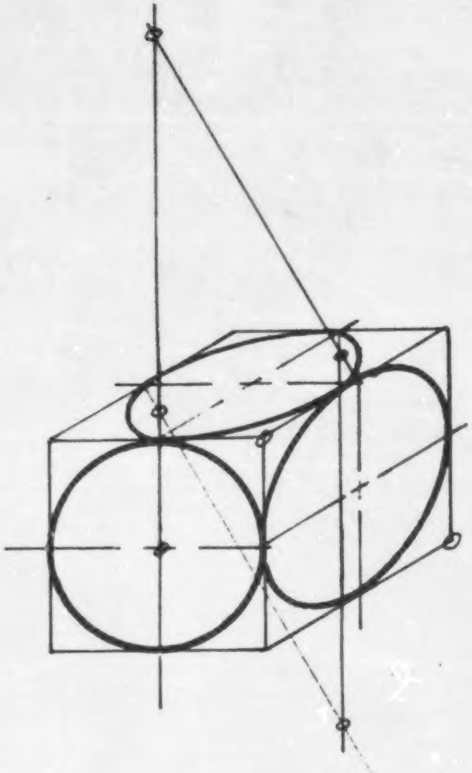
B. Up ½ height of the object.

C. At some angle ½ depth of object.

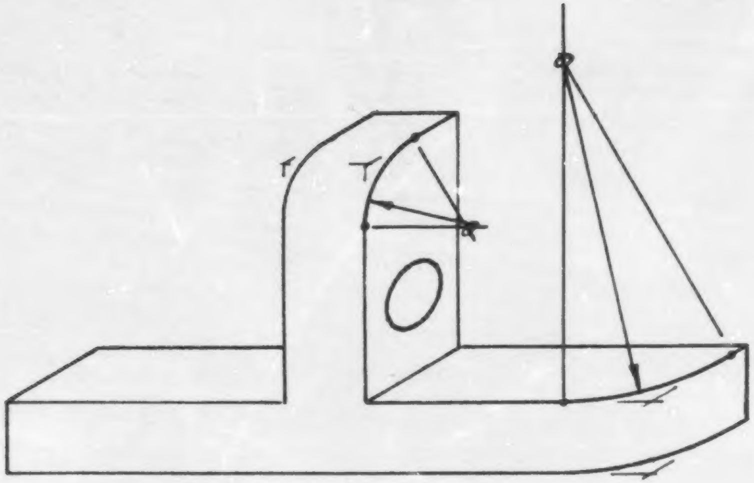
D. Across to right ½ width of the object locates front corner of object.

E. Complete object from this point.

Oblique Circles and Arcs



CIRCLES

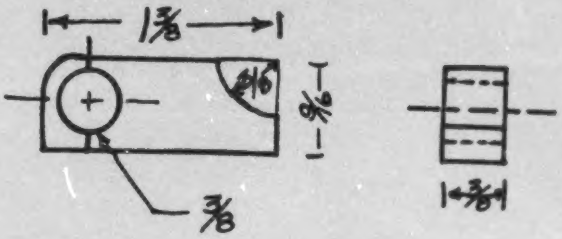


ARCS

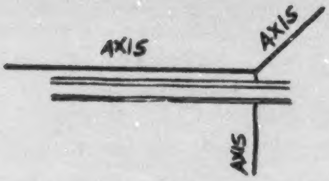
OBLIQUE DRAWINGS

ASSIGNMENT SHEET #1 - MEASURING OBLIQUE DRAWINGS

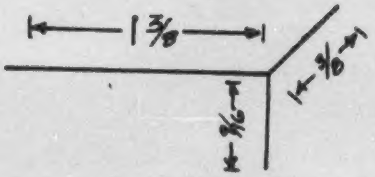
1. Sketch view to be drawn.


1 3/8
5/16
9/16
3/8
3/8

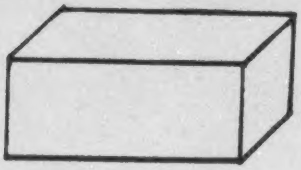
2. Layout axis lines.


AXIS
AXIS
AXIS

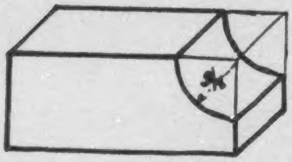
3. Measure axis lines.



4. Box in object.

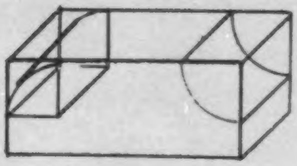


5. Draw in arc at right of box.

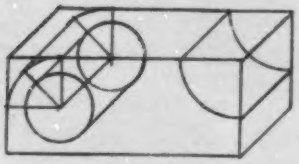


ASSIGNMENT SHEET #1

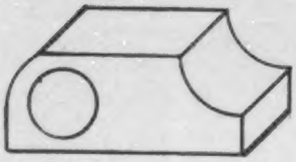
6. Draw in arc at left of box.



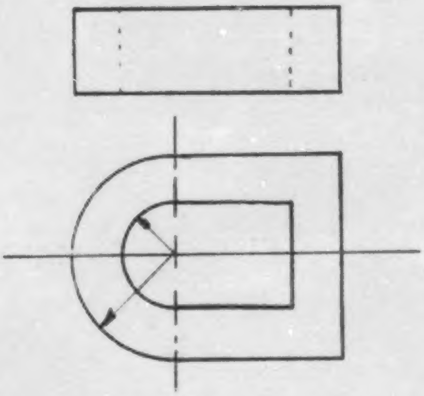
7. Add circle.



8. Erase excess working lines and darken object lines.



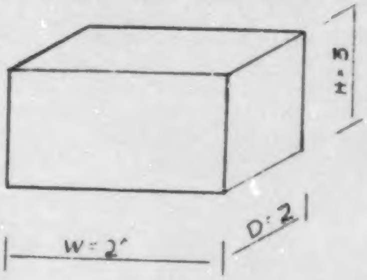
Problem - Draw the object below in oblique.



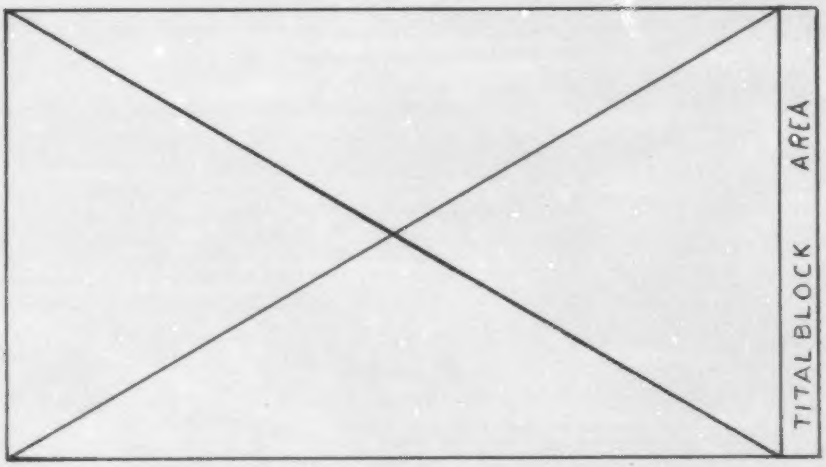
OBLIQUE DRAWING

ASSIGNMENT SHEET #2 - CENTERING AN OBLIQUE DRAWING

1. Box in the oblique sketch and dimensions of the object to be drawn.



2. Locate the center of the drawing by using diagonals.

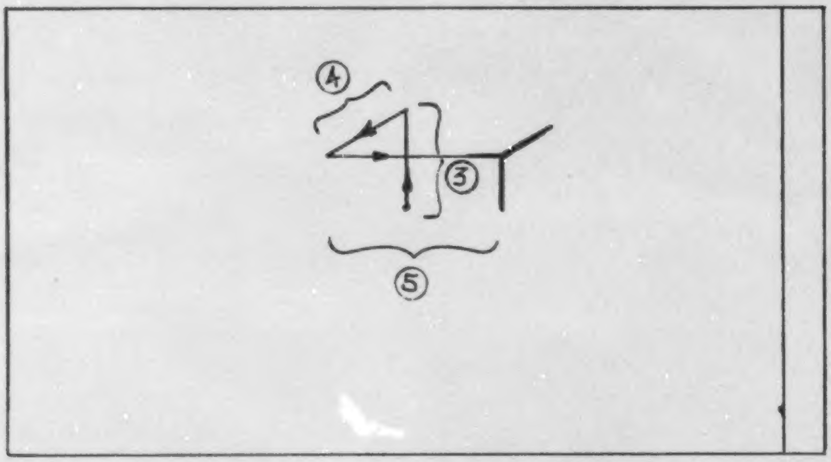

TITALBLOCK AREA

ASSIGNMENT SHEET #2

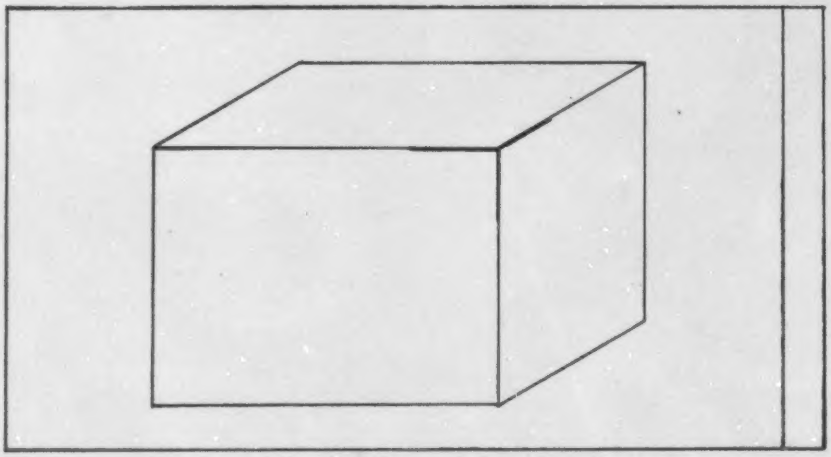
3. From the center of the work area, measure vertically ½ height of the object. (Example 1½")

4. At some angle down and to the left, measure ½ the depth of the object. (Example 1")

5. At a horizontal direction to the right, measure ½ the width of the object. (Example 2")

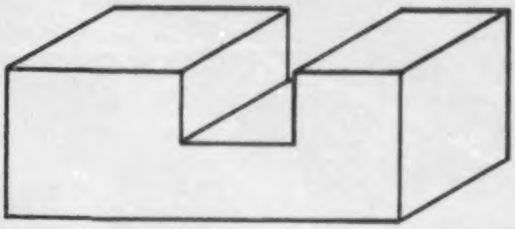


6. Complete the shape of the box.



ASSIGNMENT SHEET #2

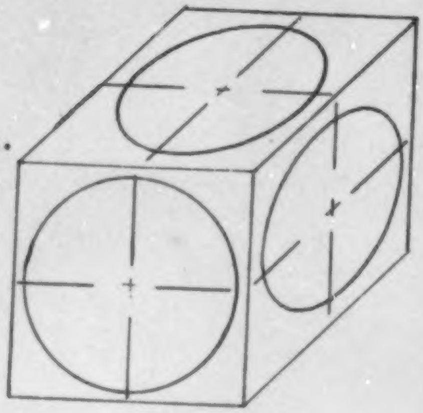
Problem - Center the oblique shown in the space below.



OBLIQUE DRAWING

ASSIGNMENT SHEET #3 - DRAWING OBLIQUE CIRLCES

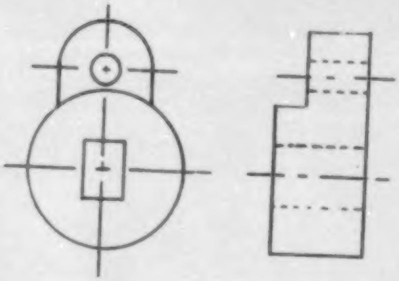
(Using compass and a four-center ellipse)



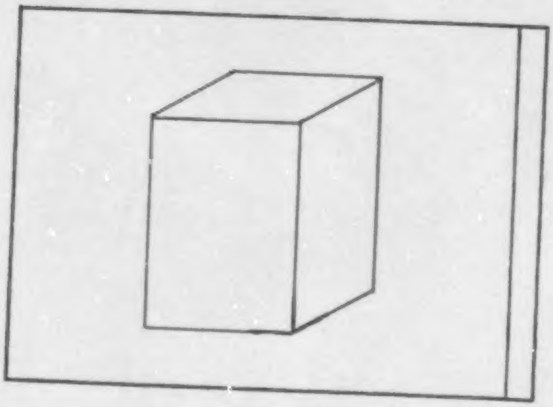
A circle can appear in any one of the three planes shown. In the front plane the circle is true. The other two planes are not and one must use this four-center ellipse method.

True circle - If possible, an object to be drawn as an oblique should be positioned so that the majority of circles or curves will appear in the front plane. It will then be possible to draw the circles or curves with a compass, therefore making the drawing easier and more legible.

1. Determine depths, heights and diameters of circles and arcs.

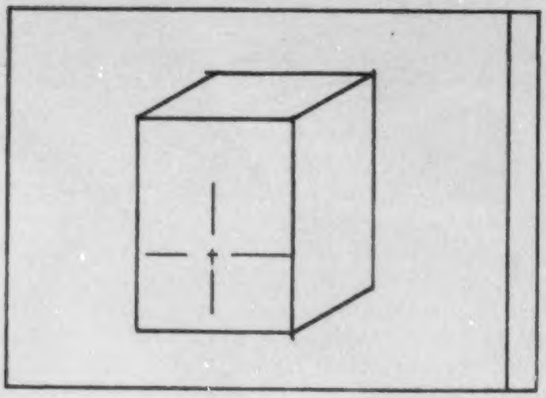


2. Center the object and box in overall shape.

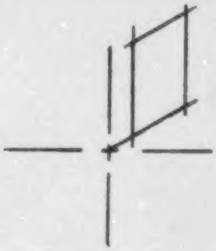


ASSIGNMENT SHEET #3

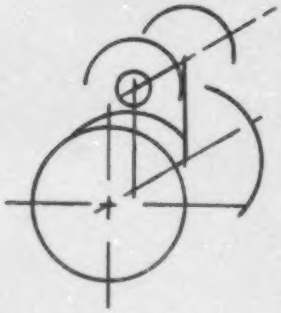
3. Locate center point of circle.



4. Layout the center points of the drawing.

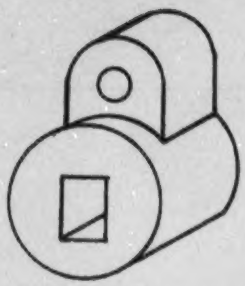


5. Draw in circles.



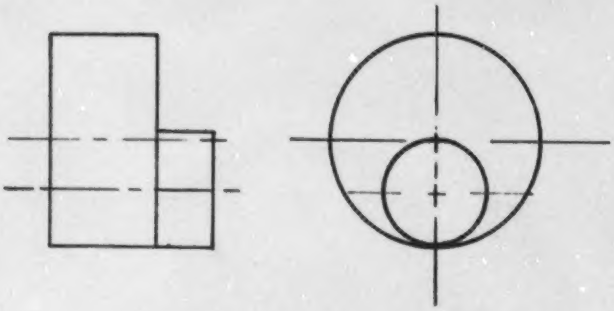
ASSIGNMENT SHEET #3

6. Draw in lines tangent to circle arcs.



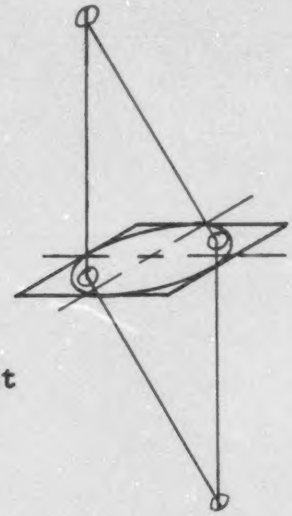
7. Add features and darken in lines.

Problem - Center an oblique view in the space provided below.

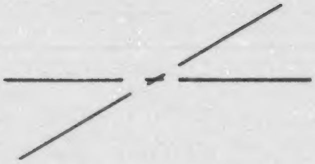


ASSIGNMENT SHEET #3

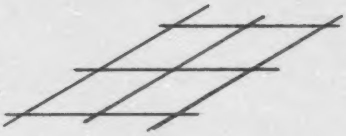
Oblique drawings can be at any angle, usually 30°, 60° or 45°



1. Locate center of circle and layout center lines. Method is the same for all angles.

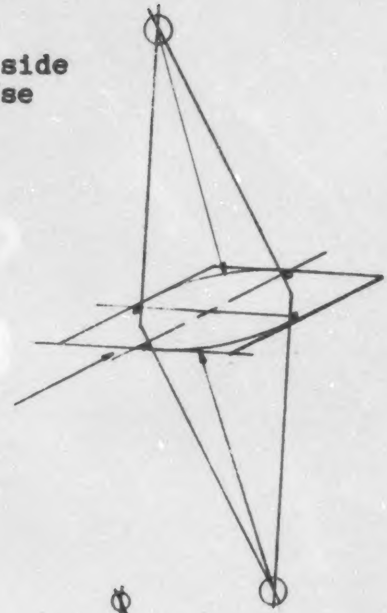


2. Mark radius points and box in sides to be parallel to center lines.

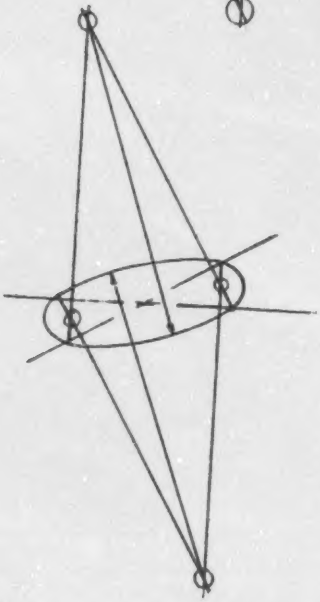


ASSIGNMENT SHEET #3

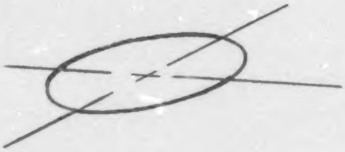
3. Erect perpendicular bisector to each side until lines intersect outside box. (Use points circled as radius.)



4. Strike arc from points where these lines intersect inside box.

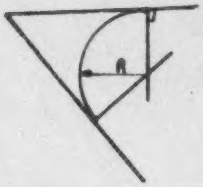


5. Erase excess lines and darken in circle.

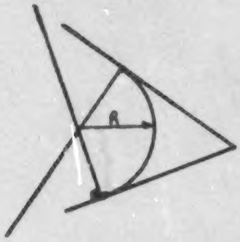


ASSIGNMENT SHEET #3

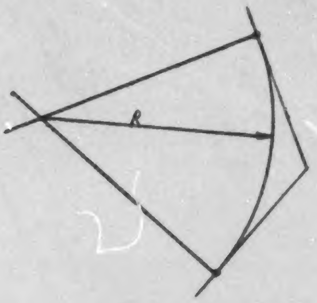
Same procedure should be used for an ellipse on the side plane.



Closed Angle

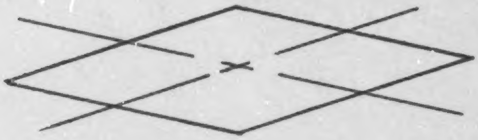


Closed Angle

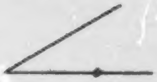


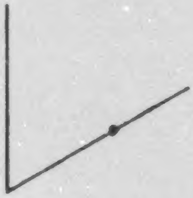
Open Angle

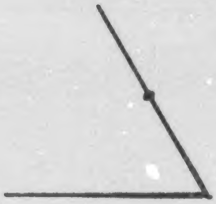
Problem - Draw the oblique circle in the box below.



Use points indicated to draw arcs in angles below.



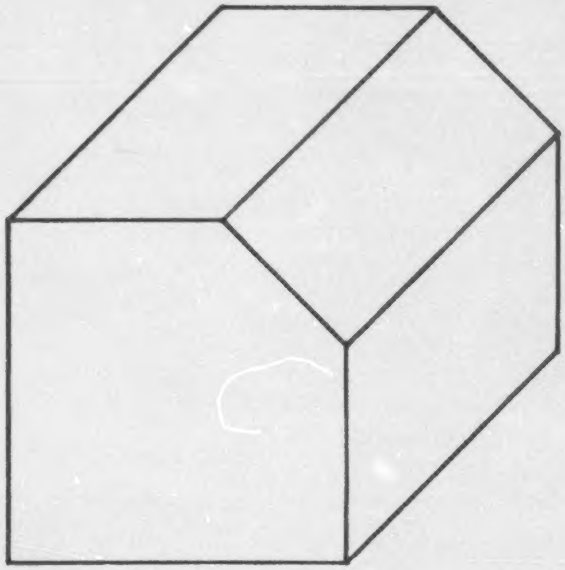




OBLIQUE DRAWING

ASSIGNMENT SHEET #4 - DRAWING A BLOCK

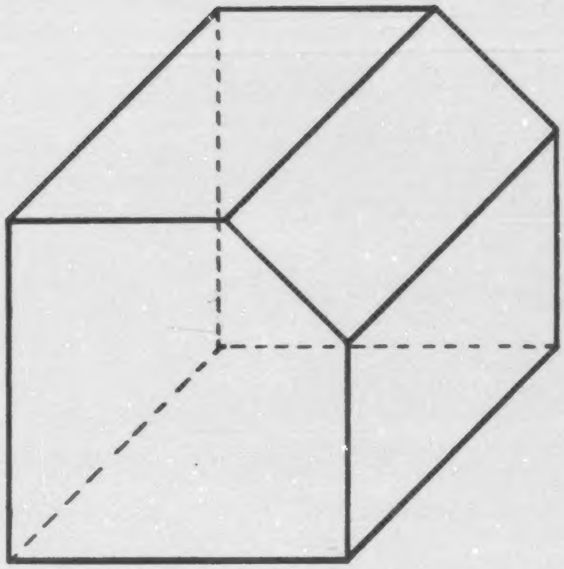
Instructions: Measure, center and draw to the best of your ability the drawing below. The scale will be 1" - 1". Upon completion of the drawing, turn it in to the instructor for evaluation.



OBLIQUE DRAWING

ASSIGNMENT SHEET #5 - DRAWING A BLOCK WITH HIDDEN LINES

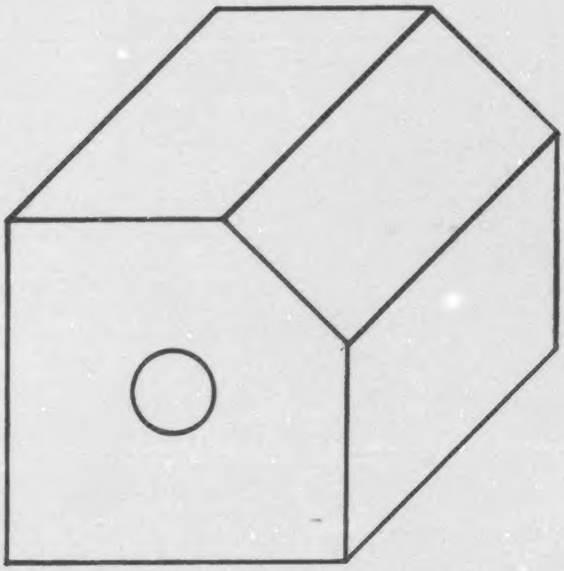
Instructions: Measure, center and draw to the best of your ability the drawing below. The scale will be 1" - 1". Upon completion of the drawing, turn it in to the instructor for evaluation.



OBLIQUE DRAWING

ASSIGNMENT SHEET #6 - DRAWING A BLOCK WITH A CIRCLE

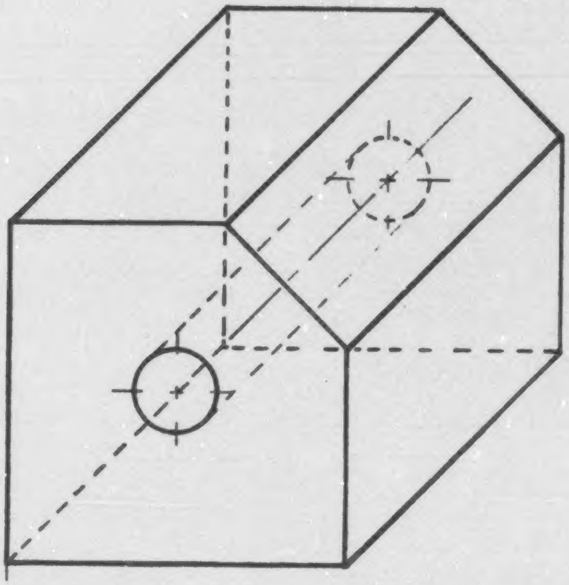
Instructions: Measure, center and draw to the best of your ability the drawing below. The scale will be 1" - 1". Upon completion of the drawing, turn it in to the instructor for evaluation.



OBLIQUE DRAWING

ASSIGNMENT SHEET #7 - DRAWING A BLOCK WITH A CIRCLE AND HIDDEN LINES

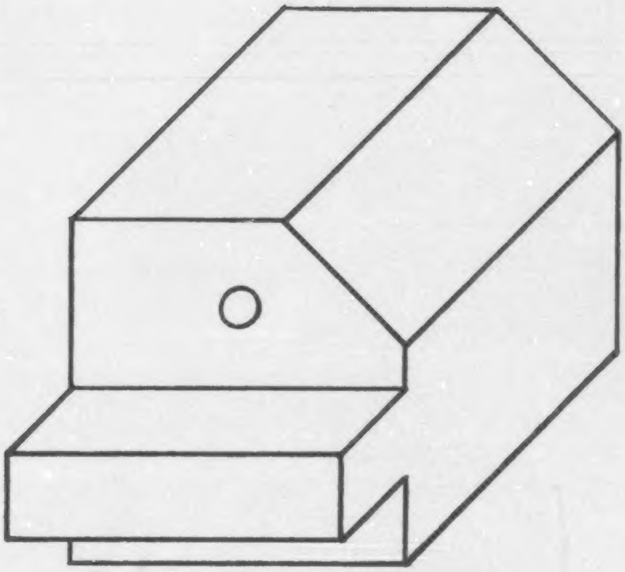
Instructions: Measure, center and draw to the best of your ability the drawing below. The scale will be 1" - 1". Upon completion of the drawing, turn it in to the instructor for evaluation.



OBLIQUE DRAWING

ASSIGNMENT SHEET #8 - DRAWING A BLOCK WITH A LEDGE AND HOLE

Instructions: Measure, center and draw to the best of your ability the drawing below. The scale will be 1" - 1". Upon completion of this drawing, turn it in to the instructor for evaluation.



OBLIQUE DRAWING

TEST

I. Terms and definitions:

___A. To appear shorter to the eye than it actually is.

___B. To extend from one point to another.

___C. The lines used to represent where surfaces come together.

___D. Picturing an object as it appears to the eye using vanishing points.

___E. A graphic representation.

___F. A circle that has been forehsortened and has a major and minor circle diameter.

___G. The lines that do not run parallel with one of the oblique axis lines.

___H. The lines that run parallel with one of the oblique axis lines.

___I. A type of picture drawing with each of the three planes of an equal axis to each other.

___J. A type of pictorial drawing with front plane horizontal and the other two at an angle to the front.

1. Perspective
2. Oblique
3. Isometric
4. Foreshortened
5. Axis line
6. Projection
7. Oblique line
8. Non-oblique line
9. Ellipse
10. Illustration

II. List three types of pictorial drawings.

A.

B.

C.

III. Draw four positions used on oblique drawings.

A. Up and to right

B. Up and to left

C. Down and to right

D. Down and to left

IV. List ten rules to follow when constructing oblique drawings.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

V. Name two methods of dimensioning oblique drawings.

A.

B.

VI. Name seven rules to use in dimensioning an oblique drawing.

A.

B.

C.

D.

E.

F.

G.

VII. List three angles in which oblique drawings are displayed off of the main axis.

A.

B.

C.

OBLIQUE DRAWING

ANSWERS TO TEST

I. A. 4
B. 6
C. 5
D. 1
E. 10
F. 9
G. 8
H. 7
I. 3
J. 2

II. A. Oblique
B. Isometric
C. Perspective

III. A. Refer to TM 2
B. Refer to TM 2
C. Refer to TM 2
D. Refer to TM 2

IV. A. All measurements must be made parallel to the main axis edges of the oblique axis line.
B. Angles are measured by coordinate offsets.
C. Hidden lines may be a problem and in some cases should be omitted.

D. Drawing should be centered.

E. Use the approximate ellipse method or templates if available on circles that cannot be drawn as regular circles.

F. Box in circles before constructing its arcs.

G. Face contour toward the front where they appear in true size.

H. Long objects should be drawn with the long axis perpendicular to the line of sight.

I. Keep all arcs and lines tangent to each other.

J. Include the rear ellipses of a hole if it is visible.

V. A. Unidirectional

B. Aligned

VI. A. Dimensions should be put in by the unidirectional or aligned method.

B. Use guide lines.

C. Dimension and extension lines should be parallel to dimensioned plane.

D. Keep dimension off objects.

E. Dimensions should be made on visible surfaces.

F. Holes should be dimensioned with notes and leaders.

G. Dimension lines should be kept even and uniform.

VII. A. 30°

B. 45°

C. 60°

SECTION G

UNIT VII

ISOMETRIC PICTORIAL DRAWING

ISOMETRIC PICTORIAL DRAWING

TERMINAL OBJECTIVE

After completion of this unit, the student will be able to identify the basic types of pictorial drawings, define terms and list rules and procedures related to isometric pictorials. The student will evidence the ability to draw through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student will be able to:

I. Define terms related to isometric drawings.

II. List three types of pictorial drawings.

III. List five places that pictorial drawings are used for illustration.

IV. Sketch four positions used as axis lines for isometric drawings.

V. List seven rules in isometric drawing construction.

VI. List six common errors made in isometric drawing.

VII. List two methods of dimensioning an isometric.

VIII. List six rules in dimensioning an isometric drawing.

ISOMETRIC PICTORIAL DRAWING

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide students with objective sheet.
- B. Provide students with information and assignment sheets.
- C. Prepare transparencies.
- D. Discuss terminal and specific objectives.
- E. Discuss information sheets.
- F. Demonstrate and discuss procedures outlined in assignment sheets.
- G. Give test.

II. Student:

- A. Read objective sheet.
- B. Study information sheets.
- C. Hand in assignment sheets.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objective sheet
- B. Information sheet
- C. Transparency masters
  1. TM 1 - Types of Isometric Drawings
  2. TM 2 - Positions of Isometric Axis Lines
  3. TM 3 - Surfaces on an Isometric
  4. TM 4 - Mistakes on Isometrics (Part 1)

5. TM 5 - Mistakes on Isometrics (Part II)
6. TM 6 - Systems of Dimensioning Isometrics
7. TM 7 - Dimensioning Procedures
8. TM 8 - Angles in Isometrics
9. TM 9 - Centering an Isometric
10. TM 10- Isometric Circles
11. TM 11- Curves in Isometric

D. Assignment sheet

1. Assignment sheet #1 - Layout Angles on an Isometric (TM 8)
2. Assignment sheet #2 - Center an Isometric (TM 9)
3. Assignment sheet #3 - Draw Isometric Circles and Arcs (TM 10)
4. Assignment sheet #4 - Draw Isometric Curves by Coordinator
5. Assignment sheet #5 = Draw Plate 5
6. Assignment sheet #6 - Draw Plate 6
7. Assignment sheet #7 - Draw Plate 7
8. Assignment sheet #8 - Draw Plate 8

E. Test

F. Answers to test

II. References:

A. Gresicke, Frederick E., Technical Drawing, New York, New York, MacMillan Publishing Co,Inc.,1974

B. Hornung, William J., Architectural Drafting, Englewood Cliffs, New Jersey, Prentice Hall, Inc.1971.

C. Thomas, T.A., Technical Illustration, New York, New York, McGraw Hill Book Co., 1968

D. Walker, John R., Exploring Drafting, South Holland, Illinois, The Goodheart Wilcox Co., Inc., 1972

E. Hartman, W.J., Basic Drafting, Stillwater, Oklahoma, Oklahoma State Department, Curriculum & Instructional Materials Center.

ISOMETRIC PICTORIAL DRAWING

INFORMATION SHEET

I. Terms

A. PICTORIAL DRAWING - Such drawings that show several faces of an object at once as it appears to the observer.

B. PERSPECTIVE - A drawing upon the plane as it appears to the eye with vanishing points.

C. OBLIQUE - A type of pictorial drawing with front plane horizontal and the other two planes at an angle to the front plane.

D. ISOMETRIC - A type of pictorial drawing with each of the three planes on an equal axis to each other.

E. FORESHORTENED - To appear shorter to eye than it actually is.

F. AXIS LINES - The lines used to represent surfaces coming together.

G. PROJECTION - To extend from one point to another.

H. ISOMETRIC LINES - Lines that are along the axis or parallel to the axis of the isometric drawing.

I. NON-ISOMETRIC LINES - A line that is not parallel.

J. ELLIPSE - A circle that has been foreshortened having major and minor diameter.

K. ILLUSTRATION - A graphic representation.

L. OFFSET COORDINATOR - The location by two reference dimensions.

II. Three types of pictorial drawings. (TM 1)

A. Perspective

B. Oblique

C. Isometric

III. Five places that pictorial drawings are used for illustrations.

A. Catalogs

INFORMATION SHEET

B. In general sales literature

C. Technical work

D. Piping diagrams

E. Patent office

IV. Four positions used as axis lines for isometric drawings. (TM 2)

A. Top position

B. Bottom position

C. Left position

D. Right position

V. Seven rules in isometric drawing construction.

A. All measurements are made parallel to the main edges of the isometric axis.

B. Angles are measured by coordinate offsets.

C. Hidden lines are omitted in isometric drawings unless they are needed to make the drawing clear.

D. A drawing should be centered in the work space and boxed in before adding details.

E. If isometric templates or ellipsographs are not available, then approximate ellipses must be constructed to represent circles.

F. Always block in a circle before constructing its arcs.

G. The sight direction that best represent the object should be used for the isometrics position.

VI. Six common errors made in isometric drawings.

A. Object viewed from wrong direction. (TM 4)

B. Circle arcs not tangent to each other. (TM 4)

C. Ellipses not in proper plane. (TM 4)

D. Tangent lines missing from circles and arcs. (TM 5)

INFORMATION SHEET

E. Rear ellipse of a hole missing. (TM 5)

F. Lines of isometric omitted. (TM 5)

G. Angles not measured correctly.

H. Dimensions not measured parallel to isometric axis lines. (TM 5)

VII. Two methods of dimensioning an isometric. (TM 6)

A. Aligned

B. Unidirectional

VIII. Six rules in dimensioning an isometric drawing. (TM 6 & 7)

A. Dimension must all be put in by the aligned method or the unidirectional method.

B. Use guidelines for all notes.

C. Dimension and extension lines should be parallel to the plane being dimensioned.

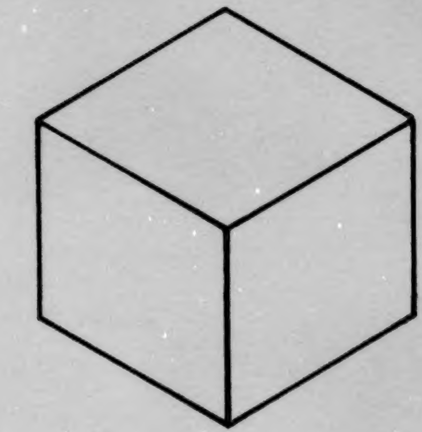
D. Keep dimensions off object if possible.

E. Dimensions should all be to visible surfaces if possible.

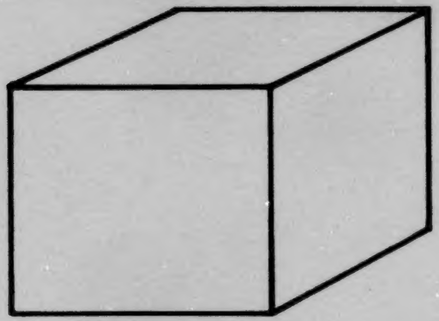
F. Dimension size of holes with notes and leaders.

G. Keep dimension lines evenly spaced and not crowding the drawing.

Types of Pictorials

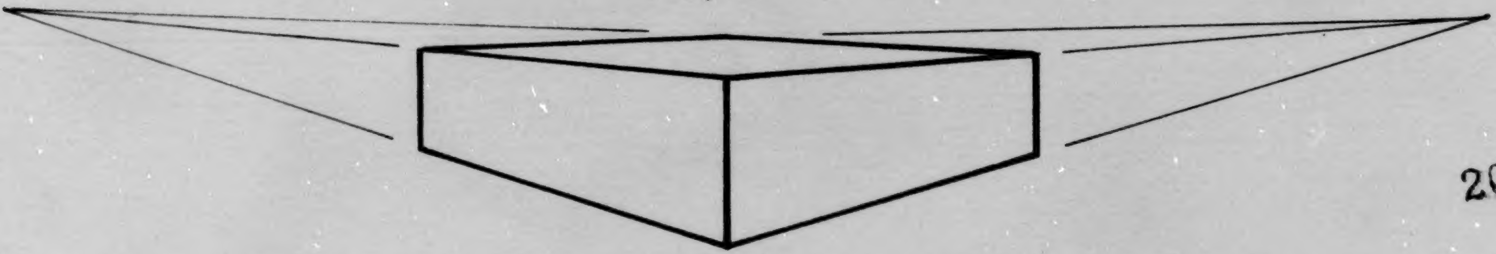


Isometric

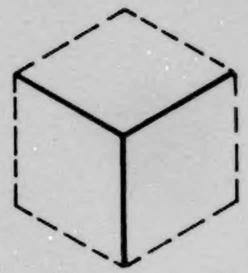


Oblique

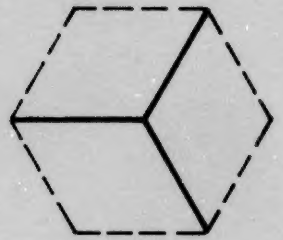
Perspective



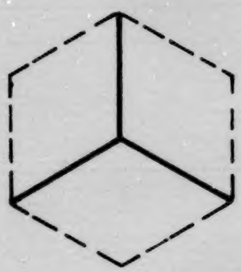
Positions of Isometric Axis Lines



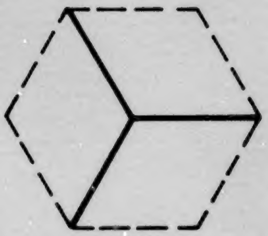
Top



Right Side

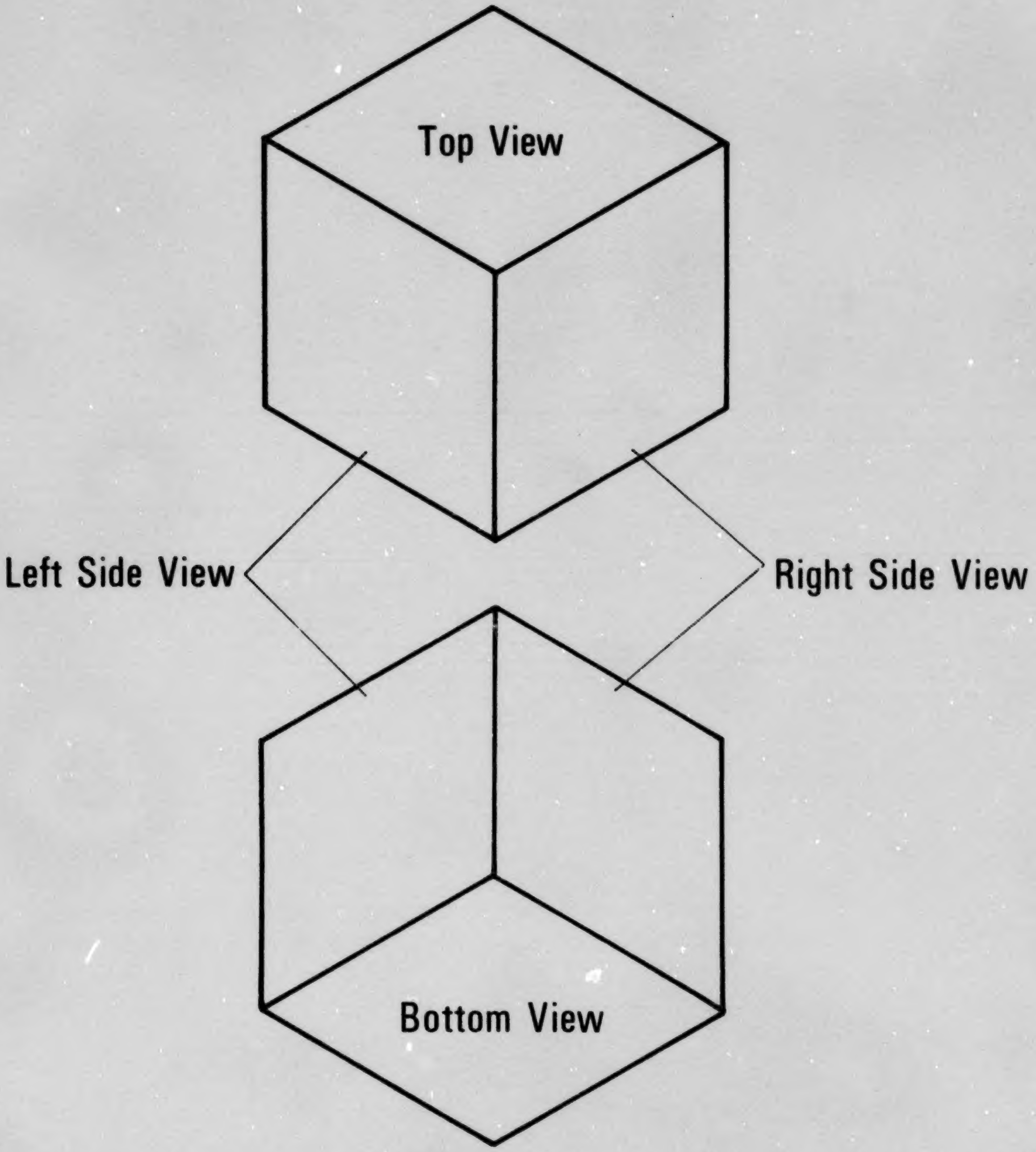


Bottom

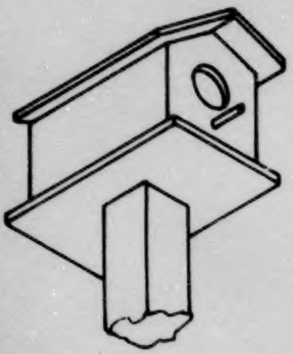


Left Side

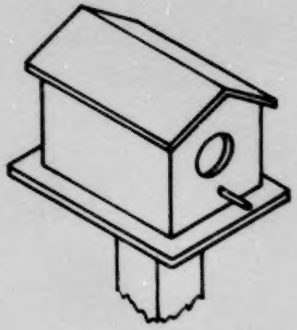
Surfaces on an Isometric


Top View
Left Side View
Right Side View
Bottom View

Mistakes on Isometrics

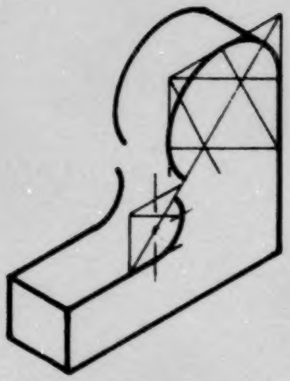


CORRECT



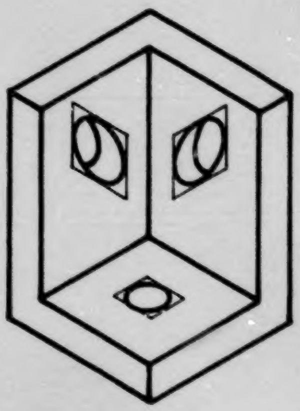
INCORRECT

Object viewed from wrong direction

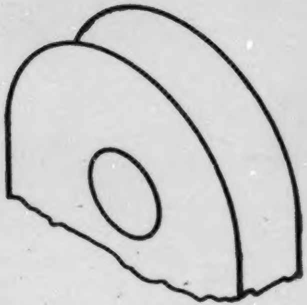


Circle arcs not tangent to each other

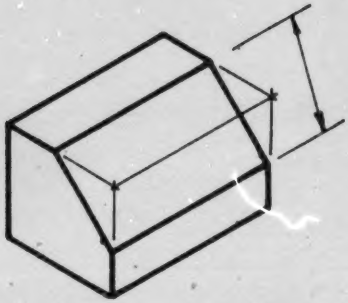
Ellipse not in proper plane



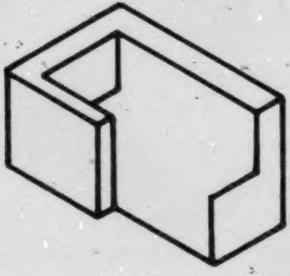
Mistakes on Isometrics



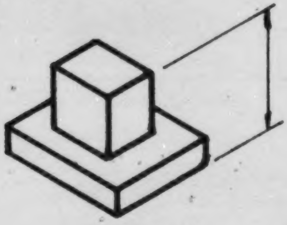
angent lines and rear ellipse missing



Angles not measured correctly

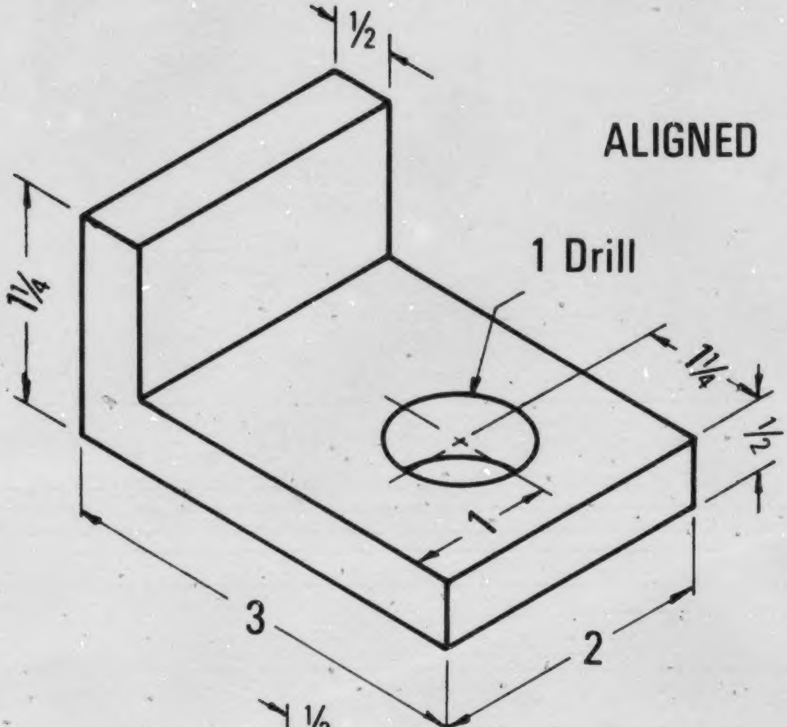


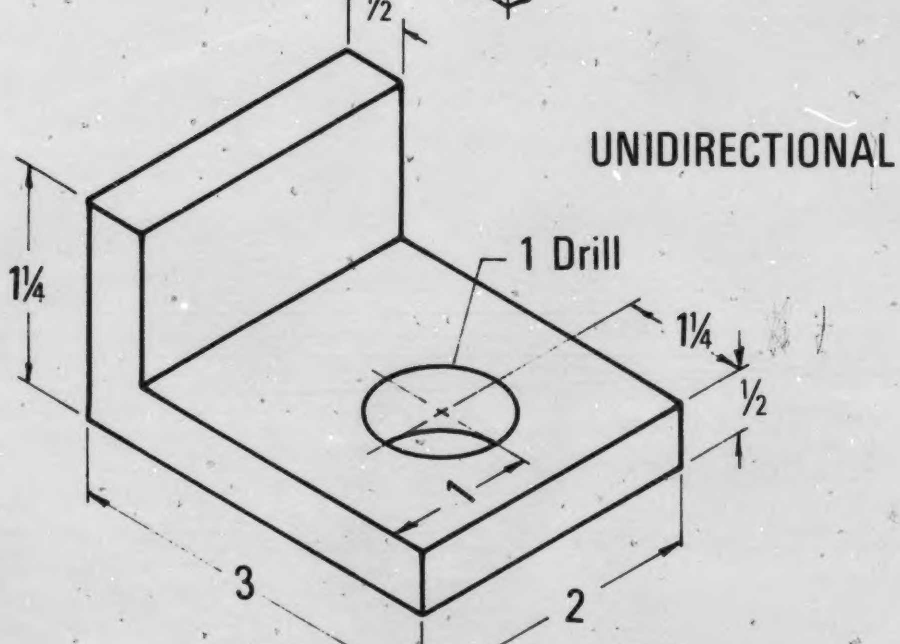
Isometric lines missing



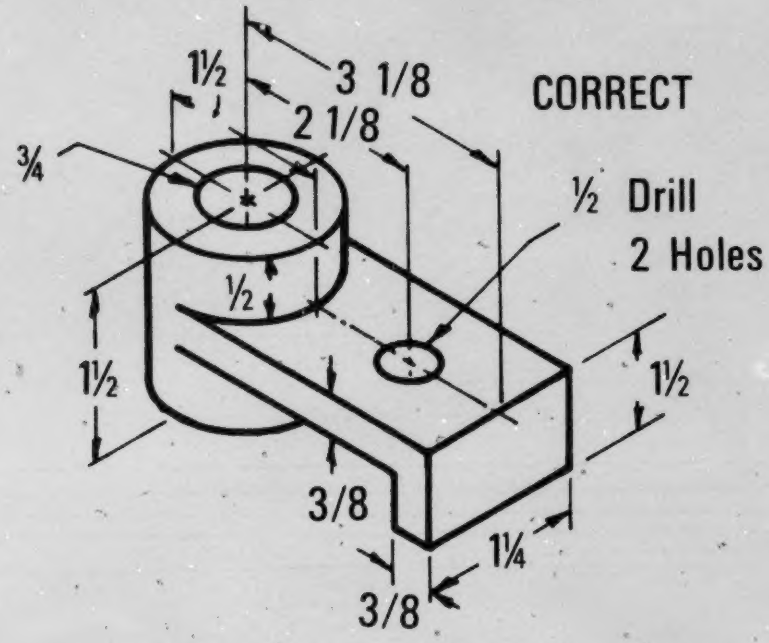
Dimensions not measured
parallel to isometric axis

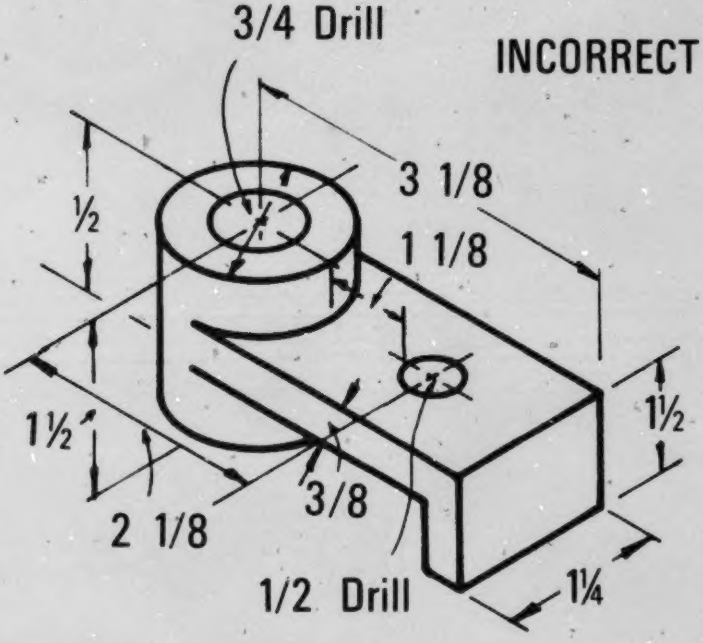
Systems of Dimensioning Isometric


½
ALIGNED
1¼
1 Drill
1¼
½
1
3
2

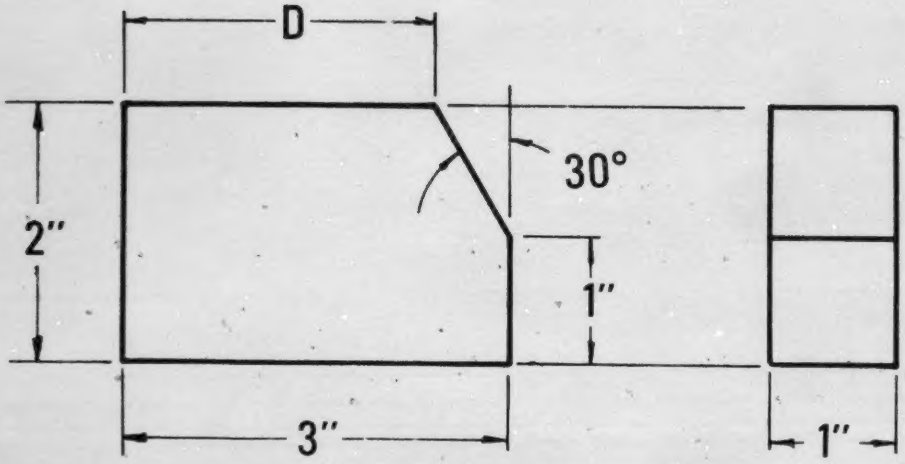

½
UNIDIRECTIONAL
1¼
1 Drill
1¼
½
1
3
2

Dimensioning Procedures

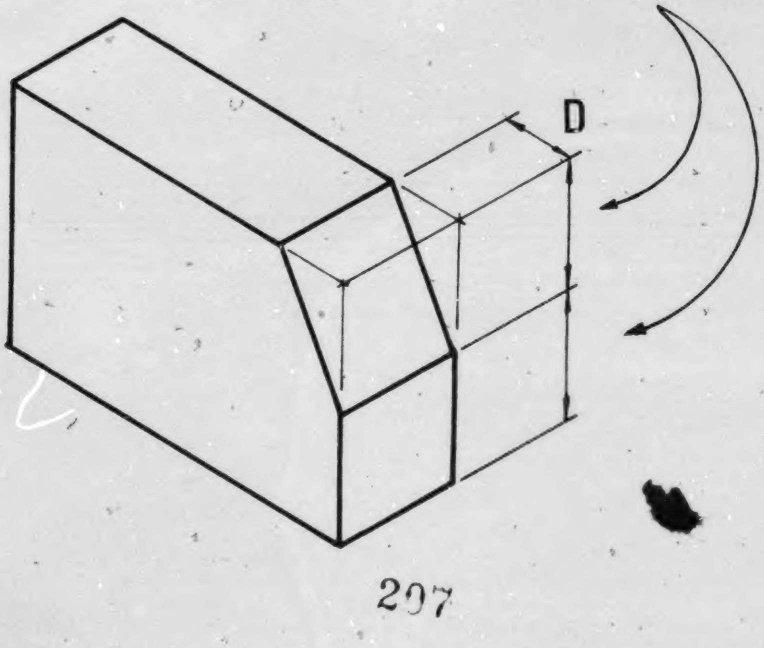

1½
3 1/8
CORRECT
2 1/8
¾
½ Drill
2 Holes
½
1½
1½
3/8
1¼
3/8


3/4 Drill
INCORRECT
½
3 1/8
1 1/8
1½
1½
2 1/8
3/8
1/2 Drill
1¼

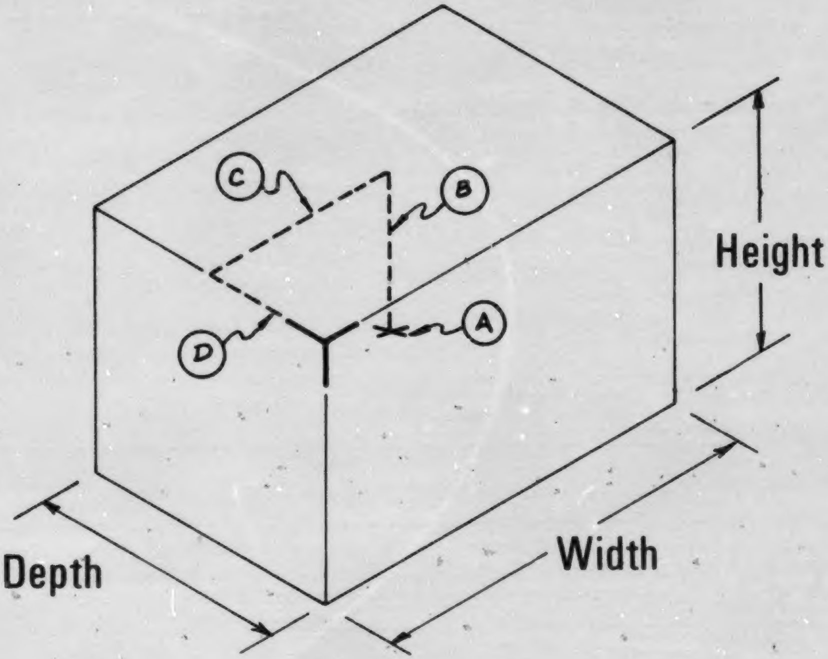
Angles in Isometric



Either dimension could be used to locate edge shown.



Centering an Isometric


C
B
Height
A
D
Depth
Width

A. Find center of paper.

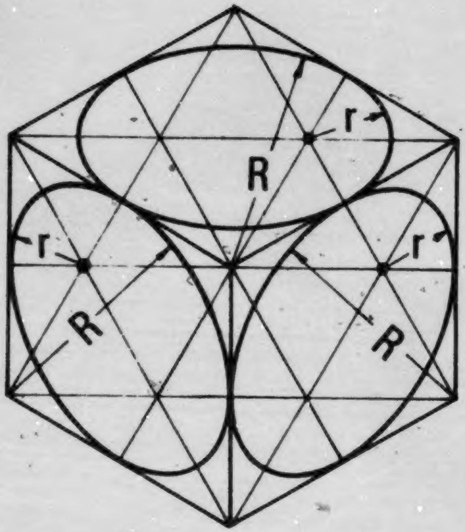
B. Up ½ height of object

C. 30° to ½ width of object

D. 30¼ to ½ depth of object locates front corner of object.

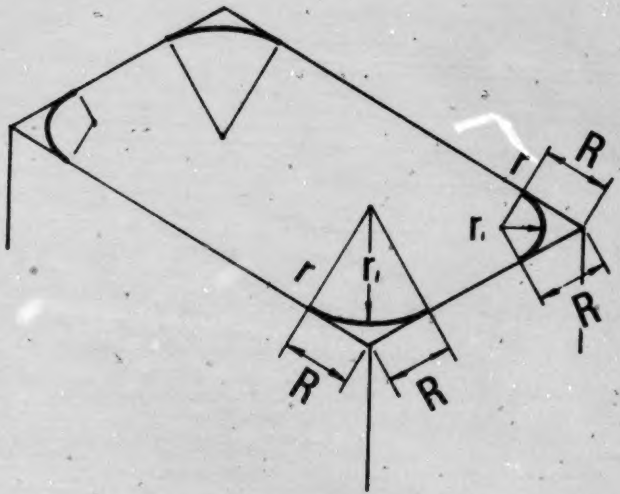
E. Complete object from this axis point.

Isometric Circles

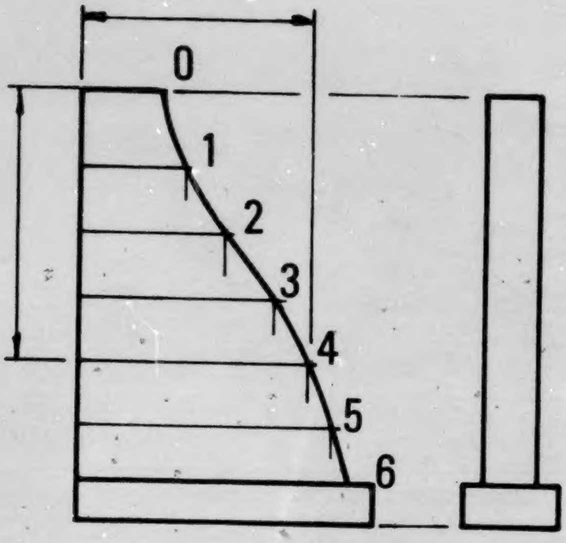


CIRCLES

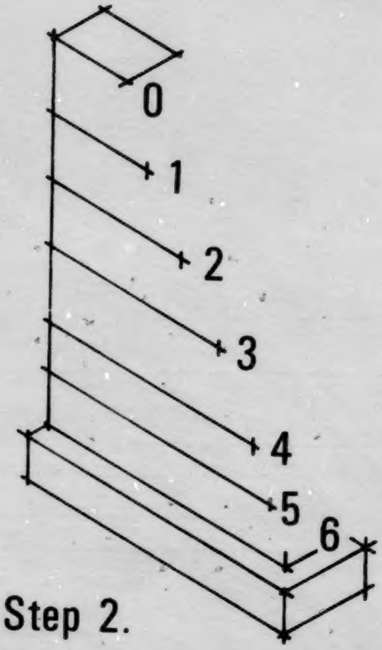
ARCS



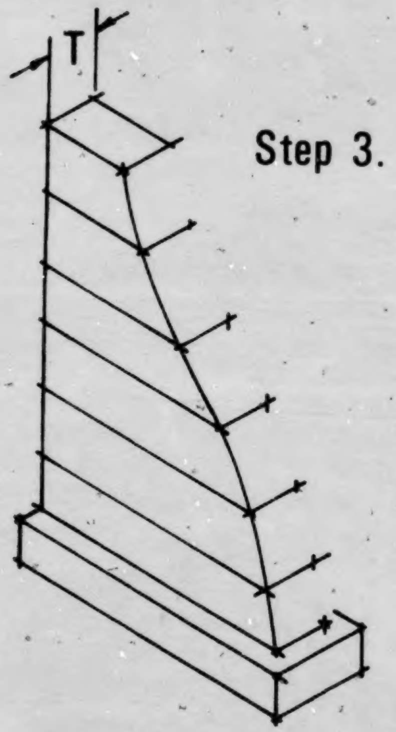
Curves in Isometric



Step 1.

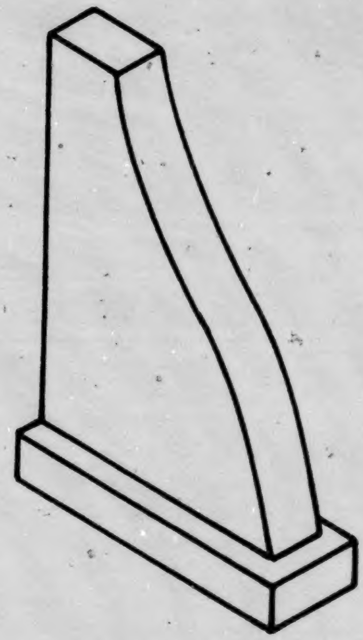


Step 2.



Step 3.

Step 4.



ISOMETRIC PICTORIAL DRAWING

ASSIGNMENT SHEET #1 - LAYOUT ANGLES ON AN ISOMETRIC

Instructions: Draw to the best of your ability the drawings found on transparency #8 and hand in to the instructor. ½" = 1'.

ISOMETRIC PICTORIAL DRAWING

ASSIGNMENT SHEET #2 - CENTER AN ISOMETRIC

Instructions: Draw to the best of your ability the drawing found on transparency #9 and hand in to the instructor. ½" = 1'.

ISOMETRIC PICTORIAL DRAWING

ASSIGNMENT SHEET #3 - DRAW ISOMETRIC CIRCLES AND ARCS

Instructions: Draw to the best of your ability the drawing found on transparency #10 and hand in to the instructor. ½" = 1'.

ISOMETRIC PICTORIAL DRAWING

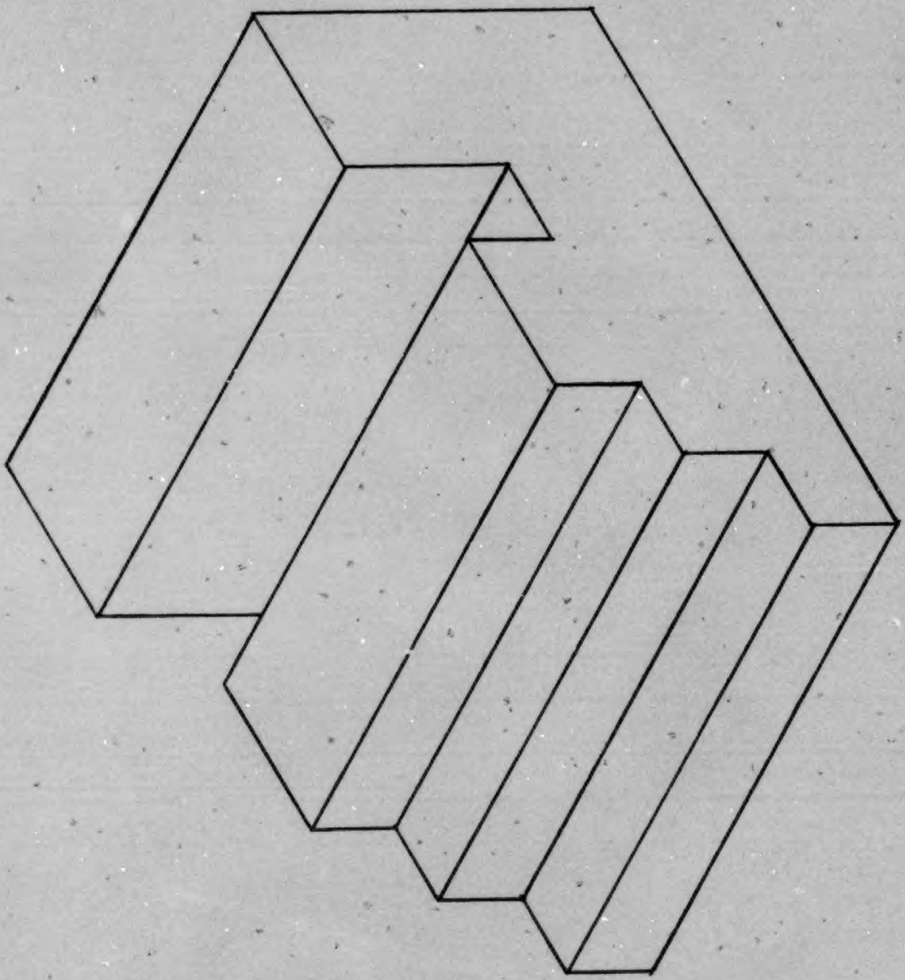
ASSIGNMENT SHEET #4 - DRAW ISOMETRIC CURVES BY COORDINATOR

Instructions: Draw to the best of your ability the drawing found on transparency #11 and hand in to the instructor. ½" = 1'.

ISOMETRIC PICTORIAL DRAWING

ASSIGNMENT SHEET #5 - DRAW PLATE FIVE

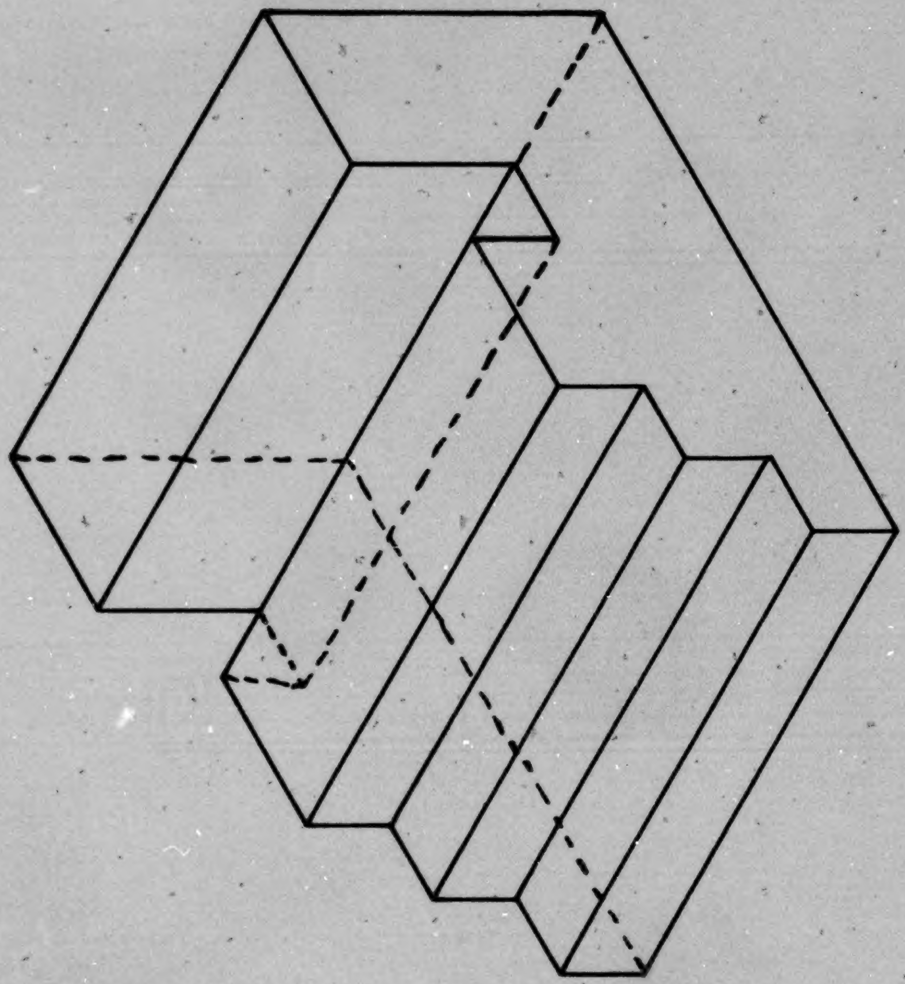
Instructions: Draw to the best of your ability plate #5 below and hand in to the instructor. ½" = 1'.



ISOMETRIC PICTORIAL DRAWING

ASSIGNMENT SHEET #6 - DRAW PLATE SIX

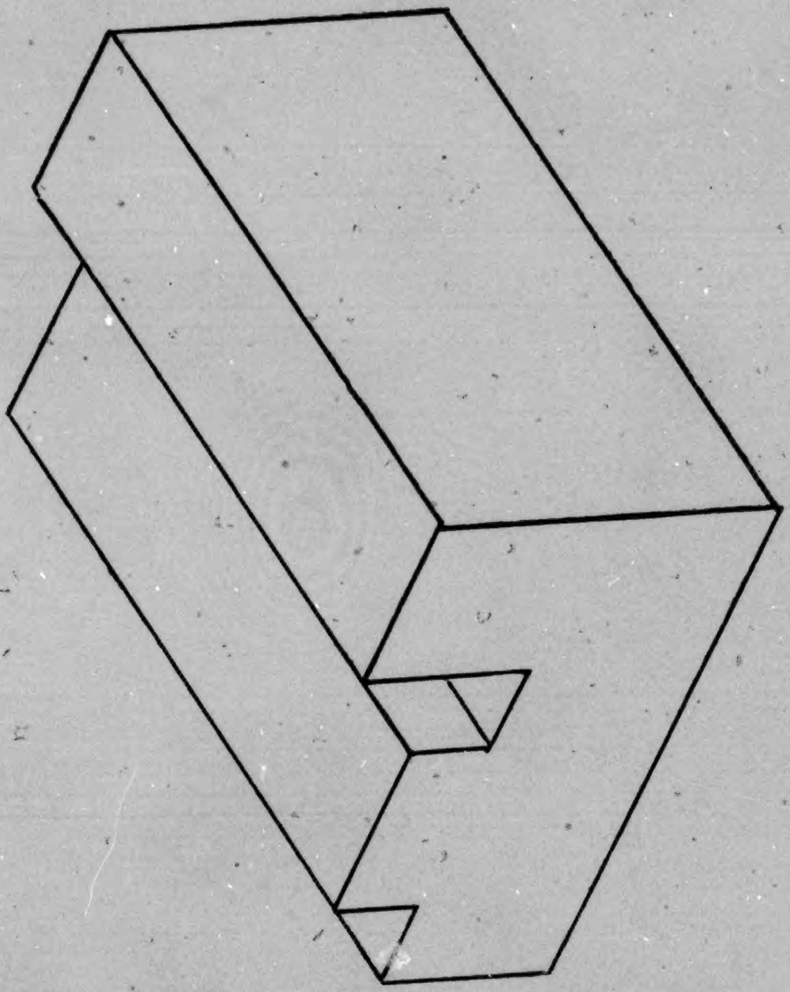
Instructions: Draw to the best of your ability plate #6 below and hand in to the instructor. ½" = 1'.



ISOMETRIC PICTORIAL DRAWING

ASSIGNMENT SHEET #7 - DRAW PLATE SEVEN

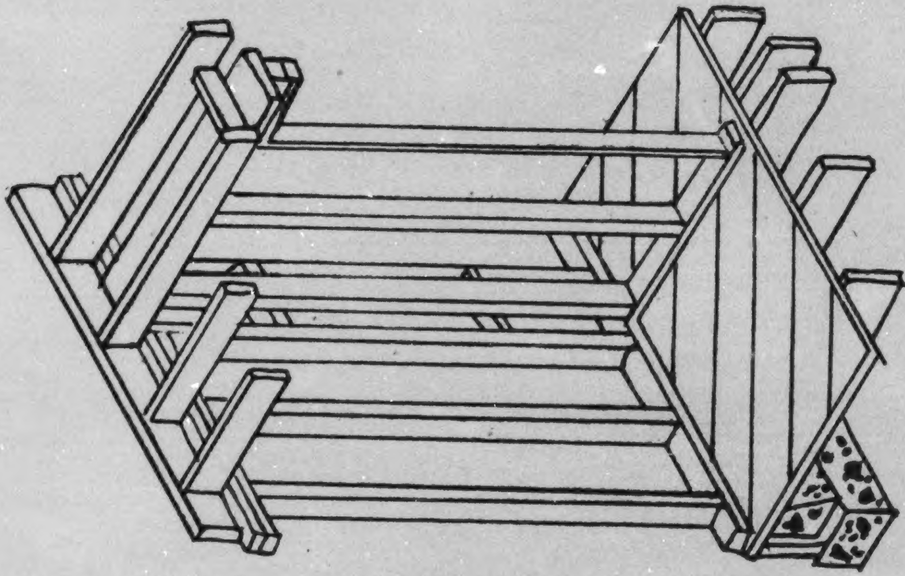
Instructions: Draw to the best of your ability plate seven below and hand in to the instructor. ½" = 1'.



ISOMETRIC PICTORIAL DRAWING

ASSIGNMENT SHEET #8 - DRAW PLATE EIGHT

Instructions: Draw to the best of your ability plate #8 below and hand in to the instructor. ½" = 1'.



ISOMETRIC PICTORIAL DRAWING

ANSWERS TO ASSIGNMENT SHEETS

Assignment sheet #1

To be evaluated by the instructor.

Assignment sheet #2

To be evaluated by the instructor.

Assignment sheet #3

To be evaluated by the instructor.

Assignment sheet #4

To be evaluated by the instructor.

Assignment sheet #5

To be evaluated by the instructor.

Assignment sheet #6

To be evaluated by the instructor.

Assignment sheet #7

To be evaluated by the instructor.

Assignment sheet #8

To be evaluated by the instructor.

ISOMETRIC PICTORIAL DRAWING

TEST

I. Define the following terms related to isometric drawing.

A. Pictorial -

B. Perspective -

C. Oblique -

D. Isometric -

E. Foreshortened -

F. Axis line -

G. Projection -

H. Isometric lines -

I. Non-isometric lines -

J. Ellipse -

K. Illustration -

L. Offset Coordinator -

II. List three types of pictorial drawings.

A.

B.

C.

III. List five places that pictorial drawings are used for illustration.

A.

B.

C.

D.

E.

IV. Sketch four positions used as axis lines for isometric drawings.

A.

B.

C.

D.

V. List seven rules in isometric drawing construction.

A.

B.

C.

D.

E.

F.

G.

VI. List six common errors made in isometric drawing.

A.

B.

C.

D.

E.

F.

VII. List two methods of dimensioning an isometric.

A.

B.

VIII. List six rules in dimensioning an isometric drawing.

A. D.

B. E.

C. F.

ISOMETRIC PICTORIAL DRAWING

ANSWERS TO TEST

I. A. Such drawings that show several faces of an object at once as it appears to the observer.

B. A drawing upon the plane as it appears to the eye with vanishing points.

C. A type of pictorial drawing with front plane horizontal and the other two planes at an angle to the front plane.

D. A type of pictorial drawing with each of the three planes on an equal axis to each other.

E. To appear shorter to the eye than it actually is.

F. The lines used to represent surfaces coming together.

G. To extend from one point to another.

H. Lines that are along the axis or parallel to the axis of the isometric drawing.

I. A line that is not parallel.

J. A circle that has been foreshortened having a major and minor diameter.

K. A graphic representation.

L. The location by two reference dimensions.

II. A. Perspective

B. Oblique

C. Isometric

III. A. Catalogs

B. In general sales literature

C. Technical work

D. Piping diagrams

E. Patent office

IV. A. Refer to TM 2

B. Refer to TM 2

C. Refer to TM 2

D. Refer to TM 2

V. A. All measurements are made parallel to the main edges of the isometric axis.

B. Angles are measured by coordinate offsets.

C. Hidden lines are omitted in isometric drawings unless they are needed to make the drawing clear.

D. A drawing should be centered in the work space and boxed in before adding details.

E. If isometric templates or ellipsographs are not available then approximate ellipses must be constructed to represent circles.

F. Always block in a circle before constructing its arcs.

G. The sight direction that best represent the object should be used for the isometrics position.

VI. A. Object viewed from wrong direction.

B. Circle arcs not tangent to each other.

C. Ellipses not in proper plane.

D. Tangent lines missing from circles and arcs.

E. Rear ellipse of a hole missing.

F. Lines if isometric omitted.

G. Angles not measured correctly.

H. Dimensions not measured parallel to isometric axis lines.

VII. A. Aligned

B. Unidirectional

VIII. A. Dimensions must all be put in by the aligned method or the unidirectional method.

B. Use guidelines for all notes.

C. Dimension and extension lines should be parallel to the plane being dimensioned.

D. Keep dimensions off object if possible.

E. Dimensions should all be to visible surfaces if possible.

F. Dimension size of holes with notes and leaders.

G. Keep dimension lines evenly spaced and not crowding the drawing.

SECTION H

UNIT VIII

TOP MAP

TOP MAP

TERMINAL OBJECTIVE

After completion of this unit, the student should be able to identify the basic skills required in top maping.This knowledge will be evidenced through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Match terms associated with top maping to the correct definition.

II. List major types of maps.

III. Name three features of topographic maps.

IV. Discuss in writing hydrographic maps.

V. Describe advantages of cadastral maps.

VI. Discuss in writing military maps.

VII. Name five features of nautical maps.

VIII. List four features of aeronautical maps.

IX. Identify two purposes of engineering maps.

X. Select factors when landscaping maps would be used.

TOP MAP

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide student with objective sheet.
- B. Provide student with information and assignment sheet.
- C. Discuss unit and specific objectives.
- D. Visit nearest office of the Department of Interior.
- E. Have examples of the area in which you live on display for the students.
- F. Give test.

II. Student:

- A. Read objective sheet.
- B. Study information sheet.
- C. Complete assignment sheet.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheet
- C. Transparency master
  - 1. TM 1 - Symbols in Top Maping
- D. Assignment sheet
  - 1. Assignment sheet #1 - Drawing Topographic Maps
  - 2. Assignment sheet #2 - Drawing Contour Maps
- E. Answers to assignment sheets

F. Test

G. Answers to test

II. References:

A. Walker, John R., Exploring Drafting, South Holland, Illinois, Wilcox,Co., Inc., 1972

B. Mitchell, Spencer and Hill, Technical Drawing, New York, New York, MacMillan Publishing Co., Inc., 1967.

C. Hornung, W.J., Architectural Drafting, Englewood, N.J., Prentice Hall Inc., 1971.

TOP MAP

INFORMATION SHEET

I. Terms and definitions:

A. MAP - Picture showing a portion of the earths surface.

B. CARTOGRAPHER - A professional map maker.

C. ELEVATIONS - The vertical distances above a common references plane or known elevation.

D. PROFILE - A line contained in a vertical plane that depicts the relative elevations of various points along the line.

E. CONTOURS - Lines drawn on a map to locate, in the plan view, point of equal ground elevation. On a single contour line therefore, all points have the same elevation.

F. HATCHURES - Short, parallel or slightly divergent lines drawn in the direction of the slope. They are closely spaced on steep slopes and converge toward tops of ridges and hills.

G. MONUMENTS - Marks the location of points accurately determined by precise surveying.

H. SCALE - Increase or decrease from actual size to drawing size.

II. Major types of maps:

A. Topographic

B. Hydrographic

C. Cadastral

D. Military

E. Nautical

F. Aeronautical

G. Engineering

H. Landscape

INFORMATION SHEET

III. Features of a topographic map:

- A. Water
  - 1. Sea
  - 2. Lakes
  - 3. Ponds
  - 4. Rivers
  - 5. Streams
  - 6. Canals
  - 7. Swamps
- B. Relief of elevation:
  - 1. Mountains
  - 2. Hills
  - 3. Valleys
  - 4. Cliffs
- C. Culture: (Works of Man)
  - 1. Town
  - 2. Cities
  - 3. Airports
  - 4. Railroads
  - 5. Boundaries

IV. Hydrographic map: Convey information concerning bodies of water such as shoreline, relative elevations of points of lake, stream and ocean beds and sounding depths.

V. Advantages of cadastral maps:

- A. Show property lines in cities and towns.
- B. Show unique features of property.

INFORMATION SHEET

VI. Military maps:

- A. Contains information of military importance:
    - 1. Troops
    - 2. Munitions
    - 3. Equipment
    - 4. Hazards

VII. Five features of nautical maps:

- A. Buoys
- B. Shoals
- C. Lighthouse
- D. Beacons
- E. Sounding depths

VIII. Four features of aeronautical maps:

- A. Prominent landmarks
- B. Towers
- C. Beacons
- D. Elevations

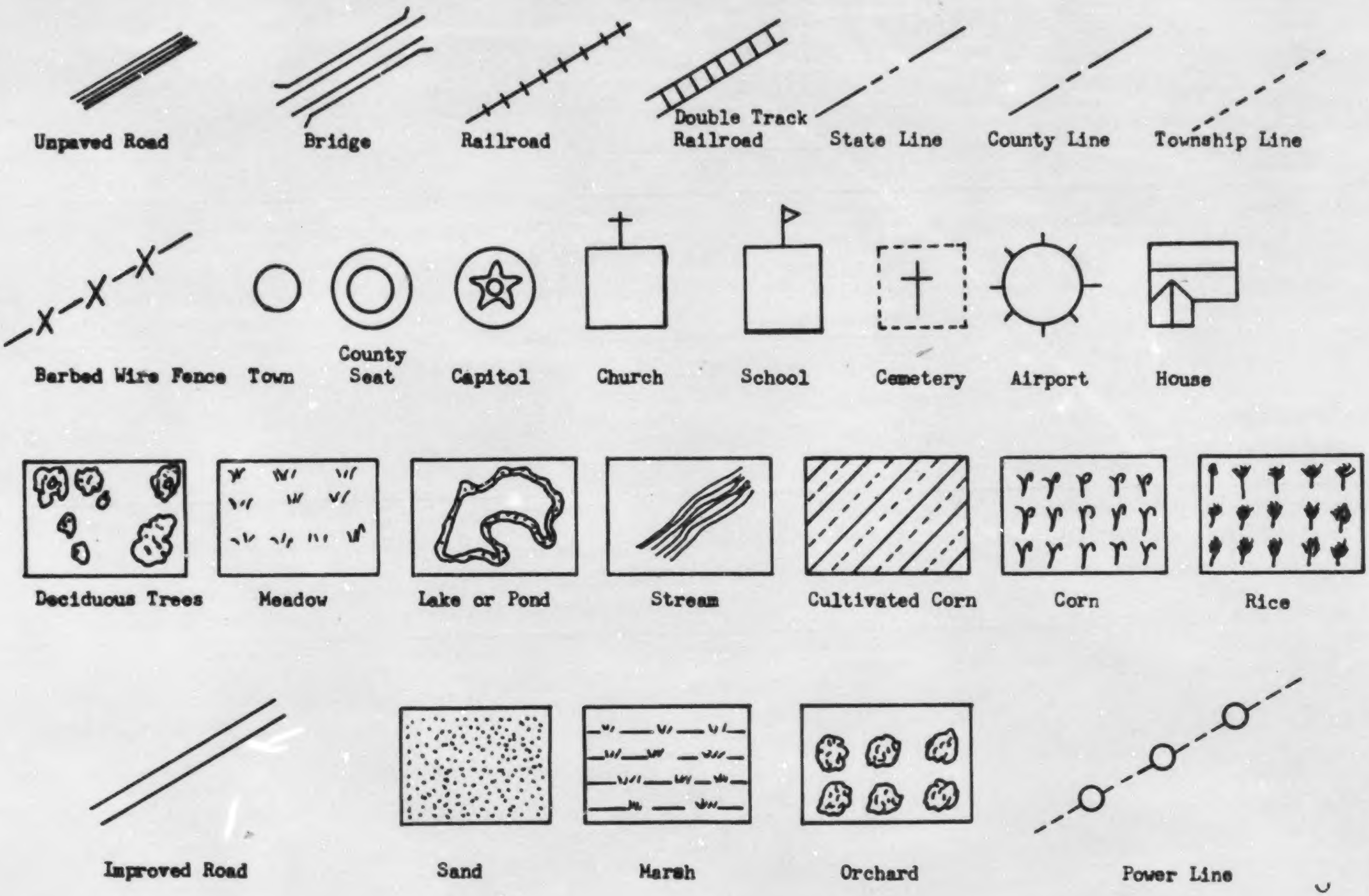
IX. Purposes of an engineering map:

- A. Locations
- B. Construction

X. Factors when landscaping maps are used:

- A. Planting trees
- B. Planting shrubbery
- C. Planning drives and sidewalks
- D. Any garden features

SYMBOLS IN TOP MAPING

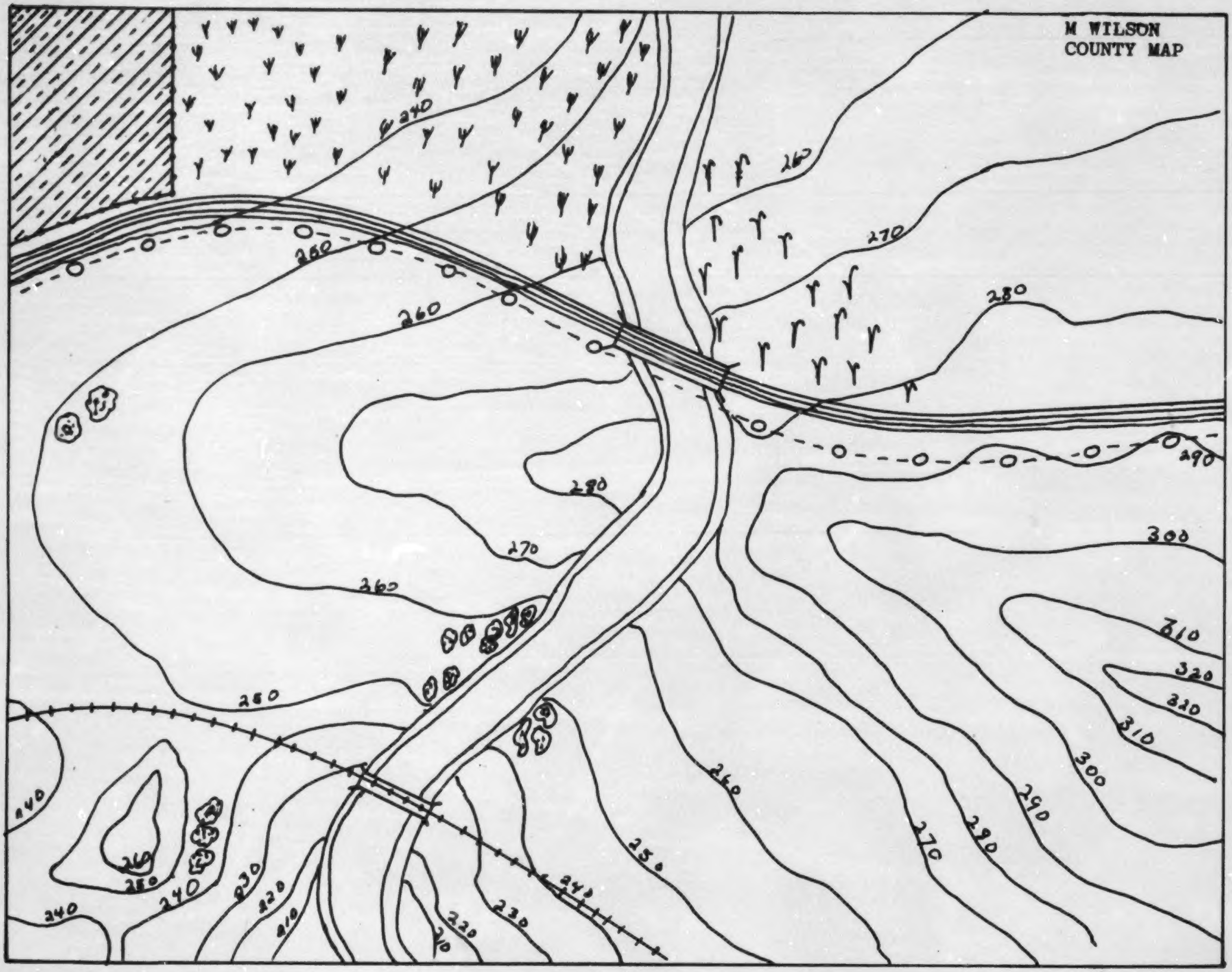

Unpaved Road
Bridge
Railroad
Double Track Railroad
State Line
County Line
Township Line
Barbed Wire Fence
Town
County Seat
Capitol
Church
School
Cemetery
Airport
House
Deciduous Trees
Meadow
Lake or Pond
Stream
Cultivated Corn
Corn
Rice
Improved Road
Sand
Marsh
Orchard
Power Line

TOP MAP

ASSIGNMENT SHEET #1 - DRAWING TOPOGRAPHIC MAPS

Directions: Draw to the best of your ability the map on the following page.

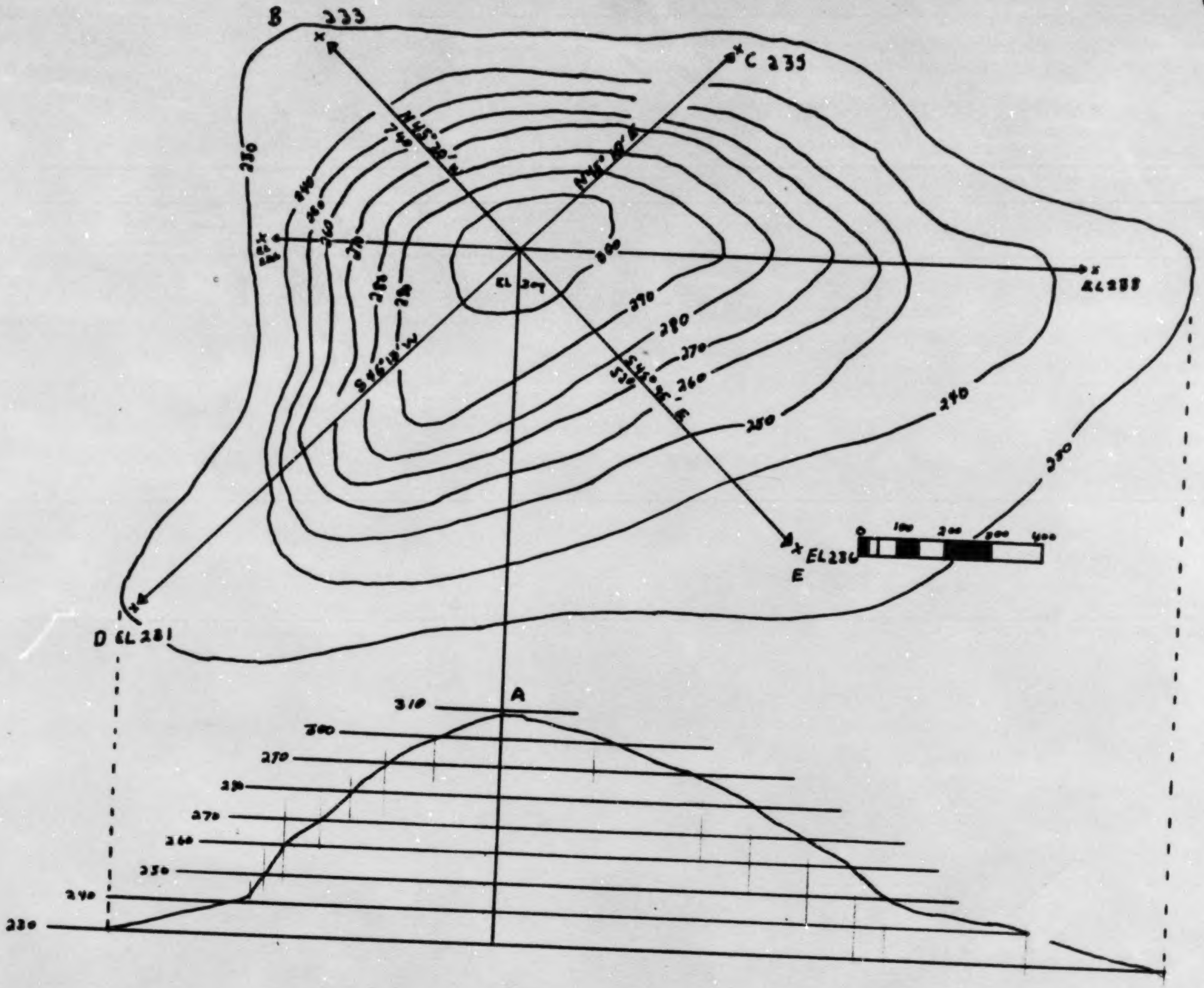
EFBL - 13-H


M WILSON
COUNTY MAP
240
260
270
250
260
280
280
290
270
300
260
310
320
320
250
310
300
260
290
240
290
270
250
260
280
240
240
230
220
210
210
220
230
240

TOP MAP

ASSIGNMENT SHEET #2 - DRAWING CONTOUR MAPS

Directions: Draw to the best of your ability the map on the following page.


B 233
C 235
N45°20'W
N45°30'E
S46°15'W
S45°35'E
EL 309
300
290
280
270
260
250
240
230
EL 238
EL 236
E
0
100
200
300
400
D EL 281
A
310
300
270
280
270
260
250
240
230

TOP MAP

ANSWERS TO ASSIGNMENT SHEETS

Assignment sheet #1

To the satisfaction of the instructor.

Assignment sheet #2

To the satisfaction of the instructor.

TOP MAP

TEST

I. Match terms associated with top maping to the correct definition.

___A. A professional map maker.

___B. Is a line contained in a vertical plane that depicts the relative elevations of various points along the line.

___C. Lines drawn on a map to locate, in the plan view, point of equal ground elevation. On a single contour line, all points have the same elevation.

___D. Picture showing a portion of the eartns surface.

___E. Increase and decrease from actual size to drawing size.

___F. Short, parallel or slightly divergent lines drawn in the direction of the slope. They are closely spaced on steep slopes and converge toward tops of ridges and hills.

___G. Vertical distances above a common reference plane or known elevation.

___H. Marks the location of points accurately determined by precise surveying.

1. Cartographer
2. Map
3. Elevations
4. Profile
5. Contours
6. Hatchures
7. Monuments
8. Scale

II. List major types of maps.

A.

B.

C.

D.

E.

F.

G.

H.

III. Name three features of topographic maps.

A.

1.
2.
3.
4.
5.
6.
7.

B.

1.
2.
3.
4.

C.

1.
2.
3.
4.
5.

IV. Discuss hydrographic maps.

V. Describe advantages of cadastral maps.

A.

B.

VI. Discuss military maps.

A.

1.
2.
3.
4.

VII. Name five features of nautical maps.

A.

B.

C.

D.

E.

VIII. List four features of aeronautical maps.

A.

B.

C.

D.

IX. Identify two purposes of engineering maps.

A.

B.

X. Select factors when landscaping maps would be used.

___A. Planting trees

___B. Planning drives

___C. Planting people

___D. Planting shrubbery

___E. Planning sidewalks

___F. Any garden feature

XI. Turn in assignment sheets #1 and #2 to be graded.

TOP MAP

ANSWERS TO TEST

- I.
  - A. 1
  - B. 4
  - C. 5
  - D. 2
  - E. 8
  - F. 6
  - G. 3
  - H. 7
- II.
  - A. Topographic
  - B. Hydrographic
  - C. Cadastral
  - D. Military
  - E. Nautical
  - F. Aeronautical
  - G. Engineering
  - H. Landscape
- III.
  - A. Water
    - 1. Sea
    - 2. Lake
    - 3. Ponds
    - 4. Rivers
    - 5. Streams
    - 6. Canals
    - 7. Swamps
  - B. Relief or elevation
    - 1. Mountain
    - 2. Hills
    - 3. Valleys
    - 4. Cliffs
  - C. Culture
    - 1. Town
    - 2. Cities
    - 3. Airports
    - 4. Railroads
    - 5. Boundaries

IV. Convey information concerning bodies of water such as shoreline, relative elevations of points of lake, stream and ocean beds and sounding depths.

V. A. Show property lines in cities and towns.

B. Show unique features of property.

VI. A. Contains information of military importance:

1. Troops

2. Munitions

3. Equipment

4. Hazards

VII. A. Buoys

B. Shoals

C. Lighthouse

D. Beacons

E. Sounding Depths

VIII. A. Prominent landmarks

B. Towers

C. Beacons

D. Elevations

IX. A. Locations

B. Construction

X. A,B,D,E,F

XI. To the satisfaction of the instructor.

SECTION I

UNIT IX

AUXILIARY VIEW

AUXILIARY VIEW

TERMINAL OBJECTIVE

After completion of this unit, the student will be able to write the purpose of using auxiliary views and follow the proper steps in drawing an auxiliary view. This knowledge will be evidenced through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Define terms related to this unit.

II. List the auxiliary views.

III. List the four uses of auxiliary views.

IV. Arrange six general steps in order that are used in constructing an auxiliary view.

V. List five steps of lines that are used to make the shape of an object.

VI. List the six views that a primary auxiliary can be projected.

VII. List the four types of object surfaces.

VIII. Write the dimensional relationship between views.

IX. List the four places reference planes can be located.

AUXILIARY VIEW

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide students with objective sheet.
- B. Provide students with information sheet.
- C. Make transparencies.
- D. Discuss terminal and specific objectives.
- E. Discuss information sheets.
- F. Give test.

II. Student:

- A. Read objective sheet.
- B. Study information sheet.
- C. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objectives
- B. Information sheets
- C. Transparency masters
    1. TM 1 - Depth Auxiliary
    2. TM 2 - Height Auxiliary
    3. TM 3 - Width Auxiliary
    4. TM 4 - Steps In Drawing an Auxiliary View
    5. TM 5 - Orthographic Views of an Object
    6. TM 6 - Possible Reference Plane Locations
- D. Test
- E. Answers to test

II. References:

A. Bynum, Jim, Exploring Drafting, South Holland, Illinois, Goodheart Wilcox Co., 1972.

B. Thomas, T.A., Technical Illustration, New York, New York, McGraw Hill Book Co., 1963.

C. Giesecke, Mitchell, Spencer and Hill, Technical Drawing, New York, New York, MacMillan Publishing Co., Inc., 1974.

D. Hartman, W.J., Basic Drafting, Stillwater, Oklahoma, State Department of Vocational and Technical Education, 1972.

AUXILIARY VIEW

INFORMATION SHEET

I. Terms and definitions:

A. LINE OF SIGHT - The direction an object is being viewed.

B. PROJECT - To extend from one point to another point.

C. AUXILIARY VIEW - Extra view or views other than orthographic views.

D. PERPENDICULAR - At a 90° angle.

E. REFERENCE PLANE LINE - A common line from which measurements are taken.

F. INCLINED SURFACE - A surface at an angle to another.

G. CURVED SURFACE - A surface on a radius or series of arcs.

H. SKEWED SURFACE - A surface turned or positioned at an angle to two orhtographic planes.

I. EDGE VIEW - A view looking into the side of a surface.

J. TRUE SIZE - A surface that is shown in its actual size.

K. TRANSFER POINTS - Measuring location of points in one view and transferring to another view.

L. DIVIDERS - An instrument used to transfer distance measurements.

M. CONSTRUCTION LINES - Light, temporary lines used to layout the rough shape of an object being drawn.

N. PARTIAL VIEW - A view that shows only a part of the whole object.

O. SYMMETRICAL - The same size on both sides of a center line.

P. AUXILIARY SECTION - An auxiliary view drawn as a section through an area.

Q. PRIMARY AUXILIARY - An auxiliary projected from one of the primary views. (top, front, side, etc.)

INFORMATION SHEET

- R. SECONDARY AUXILIARY - An auxiliary projected from a primary auxiliary.
- S. FOLD LINE - A theoretical line between views where picture planes fold. (Used as a reference line)
- T. TRUE LENGTH LINE - A line that appears in its actual length.

II. The classification of auxiliary views.

- A. Depth Auxiliary - It shows the principal dimension of the object. (Any auxiliary view projected from the front view will show the depth of the object.) TM 1
- B. Height Auxiliary - Any auxiliary view projected from the top view. TM 2
- C. Width Auxiliary - Any auxiliary projected from the side view (either side). TM 3

III. The four uses of auxiliary views.

- A. True length of line
- B. Point view of line
- C. Edge view of plane
- D. True size of plane

IV. Steps in constructing an auxiliary view. TM 4

- A. Determine line of sight.
- B. Introduce reference or fold lines.
- C. Draw light projection lines.
- D. Transfer points.
- E. Determine visibility.
- F. Complete the view.

V. Types of lines that make the shape of an object.

- A. Horizontal
- B. Vertical

INFORMATION SHEET

C. Inclined

D. Curved

E. Skewed

VI. Views from which a primary auxiliary may be projected. TM 5

A. Top

B. Front

C. Left side

D. Right side

E. Bottom

F. Back

VII. Types of surfaces.

A. Normal

B. Inclined

C. Skewed

D. Curved

VIII. Dimensional relationship between views. TM 5

A. Same height - Front, right side, left side, back.

B. Same width - Front, top, bottom, back.

C. Same depth - Top, right side, left side, bottom.

IX. Places reference planes can be located. TM 6

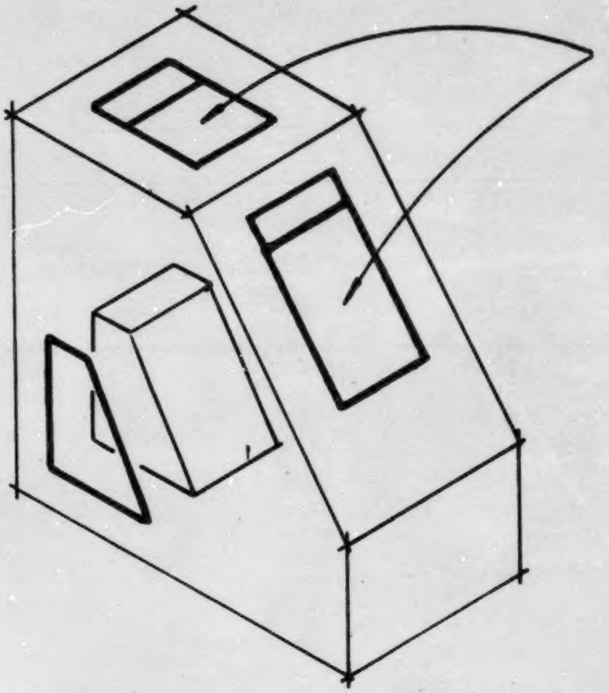
A. Back of view

B. Center of view

C. Front of view

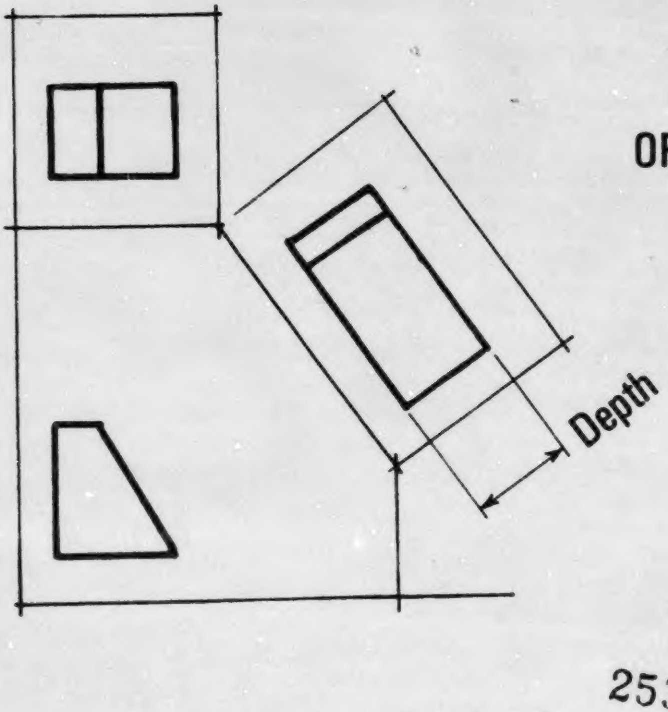
D. Between views

Depth Auxiliary



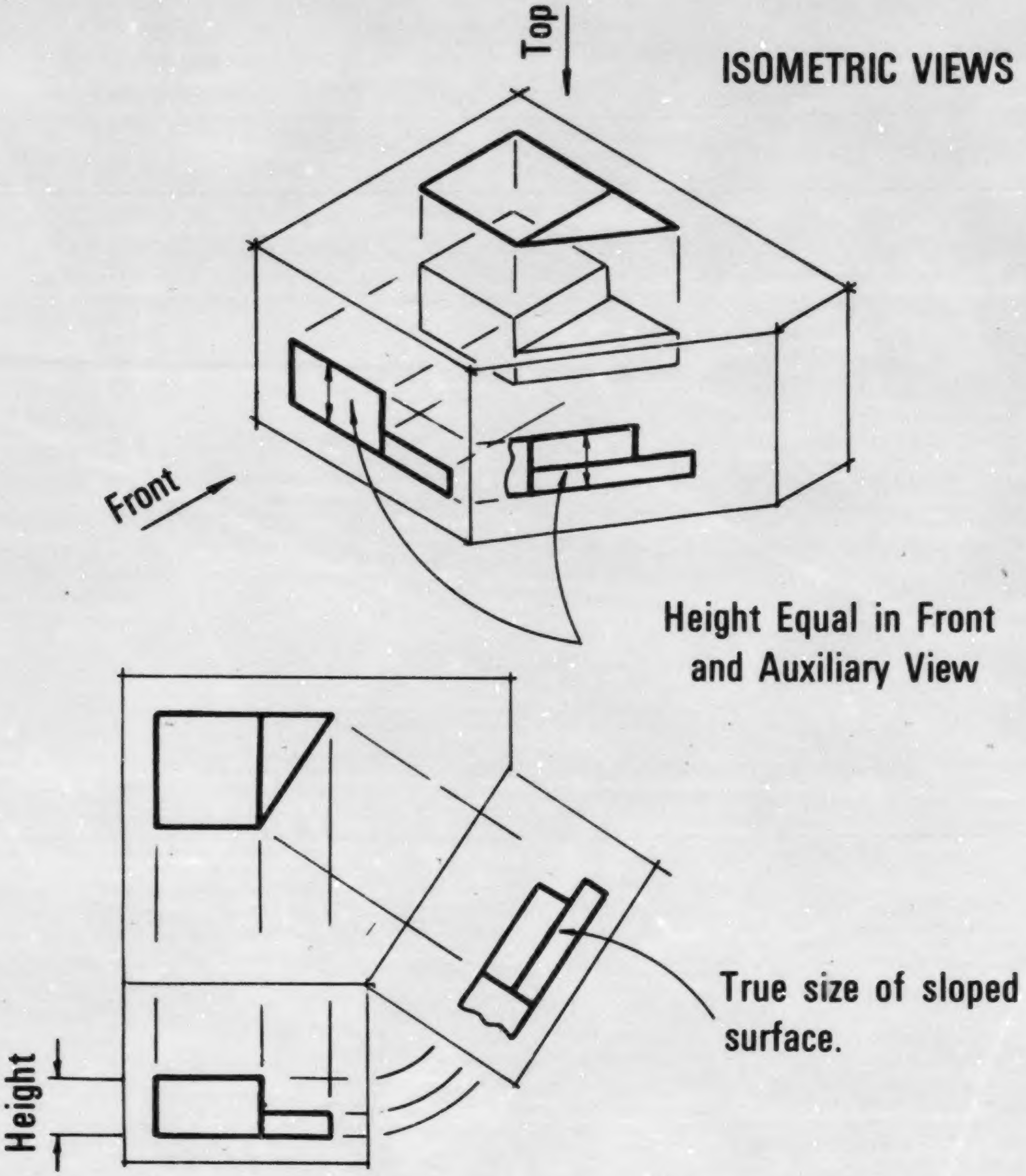
Depth Equal in Top and Auxiliary Views

ISOMETRIC VIEWS



ORTHOGRAPHIC VIEWS

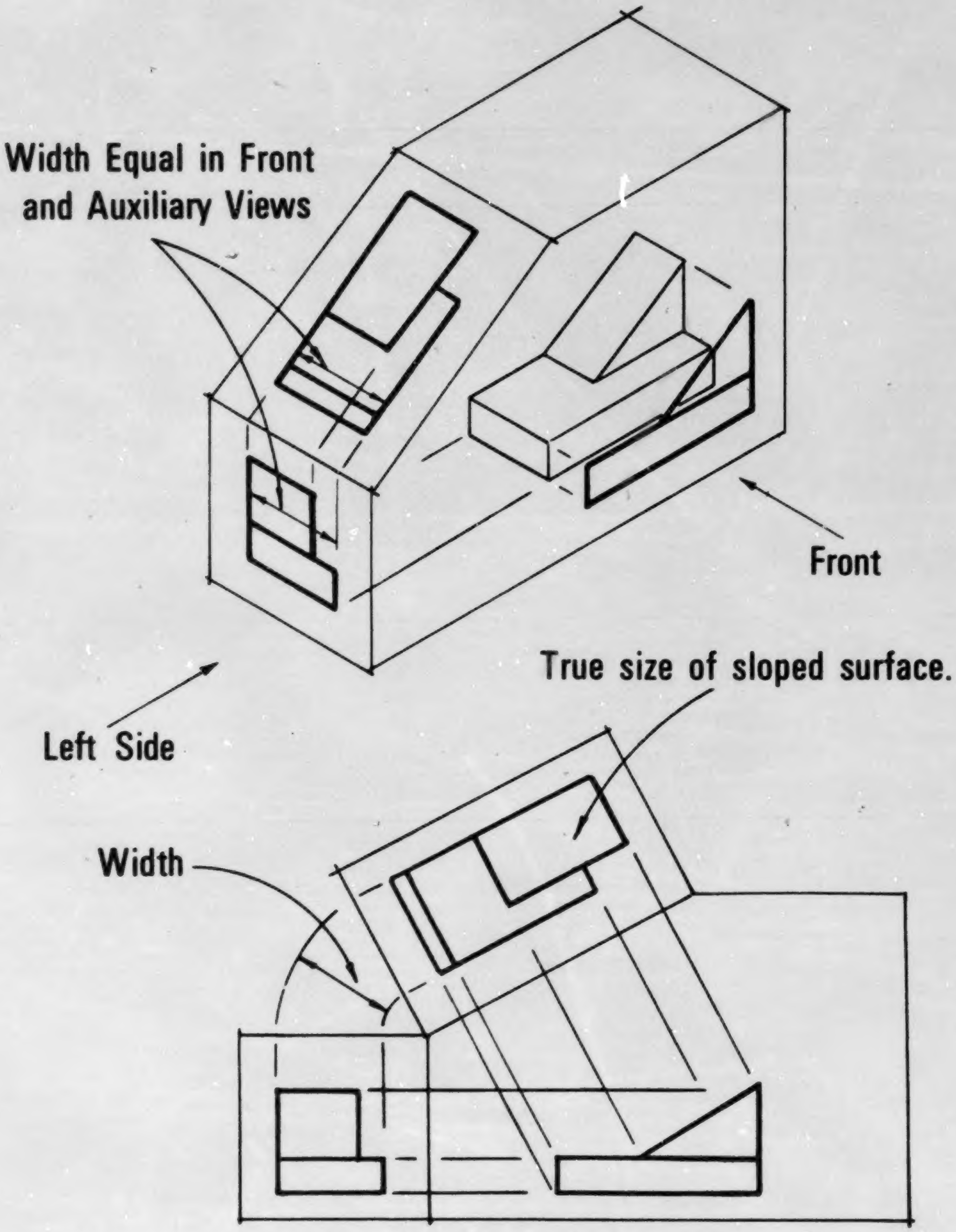
Height Auxiliary


Top
ISOMETRIC VIEWS
Front
Height

Height Equal in Front and Auxiliary View

True size of sloped surface.

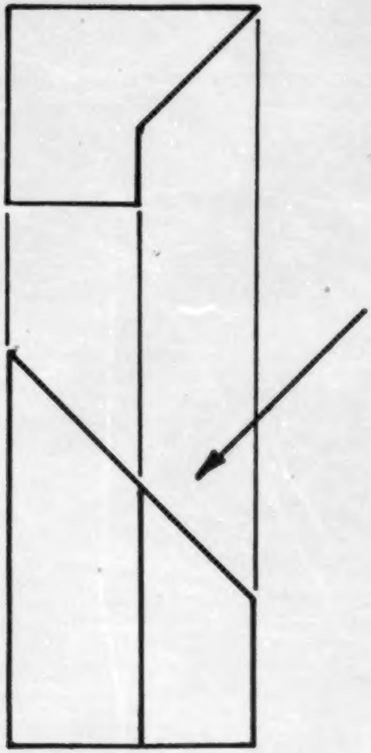
Width Auxiliary


Width Equal in Front and Auxiliary Views
Front
Left Side
True size of sloped surface.
Width

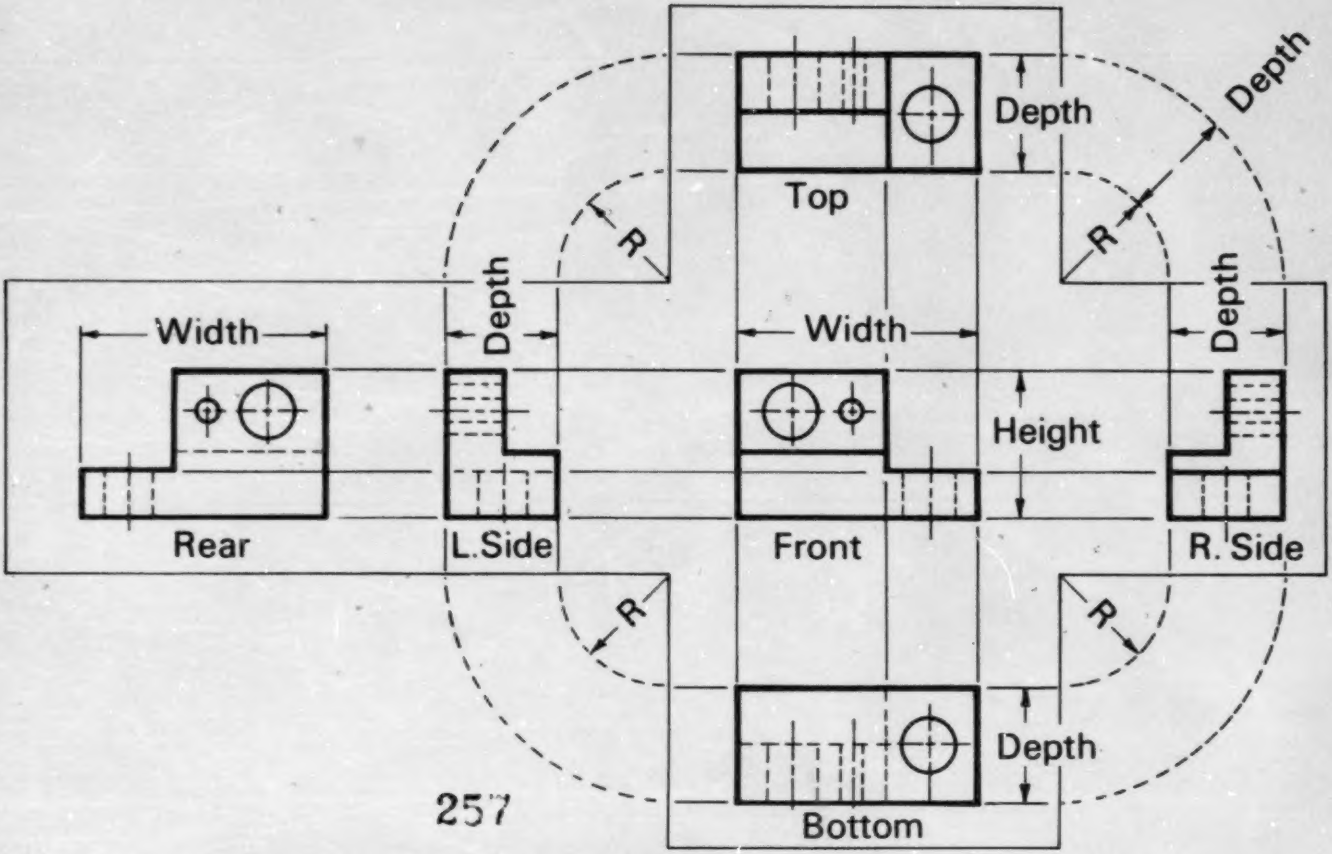
Steps in Drawing an Auxiliary View

Two views given with top surface sloping down.
True size needed.

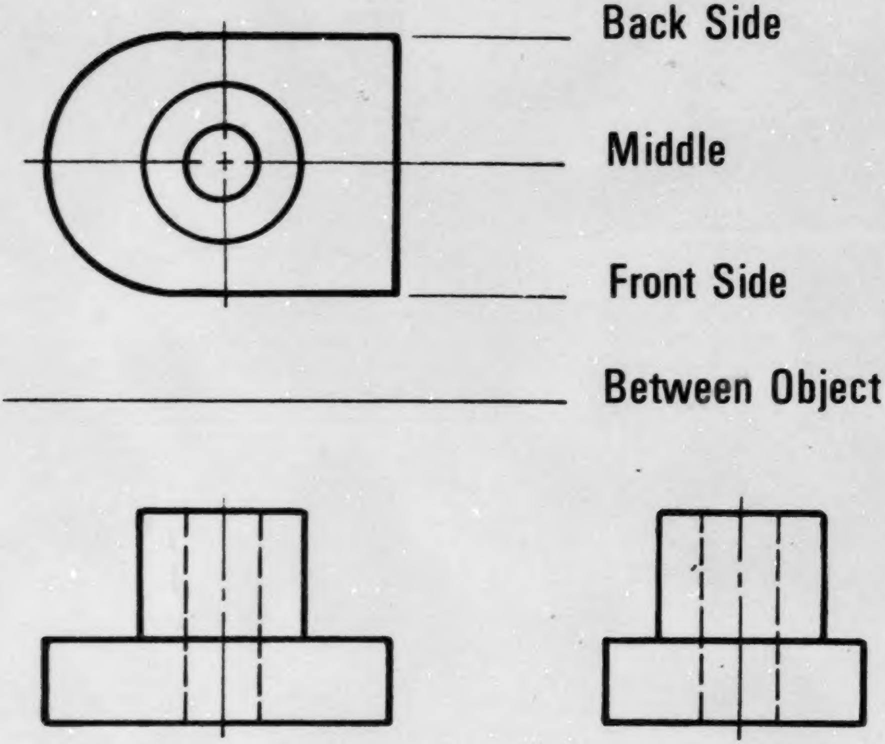
- Line of sight perpendicular to edge of sloped surface.



Orthographic Views of an Object


Top
Depth
Depth
R
R
Depth
Width
Depth
Width
Depth
Height
Rear
L.Side
Front
R. Side
R
R
Depth
Bottom

Possible Reference Plane Locations



Back Side

Middle

Front Side

Between Object

AUXILIARY VIEW

TEST

I. Define the following terms:

- A. Line of sight -
- B. Project -
- C. Auxiliary view -
- D. Perpendicular -
- E. Reference plane line -
- F. Inclined surface -
- G. Curved surface -
- H. Skewed surface -
- I. Edge view -
- J. True size -
- K. Transfer point -
- L. Dividers -
- M. Construction -
- N. Partial view -
- O. Symmetrical -
- P. Auxiliary section -
- Q. Primary auxiliary -
- R. Secondary auxiliary -
- S. Fold line -
- T. True length -

II. List the auxiliary views.

- A.
- B.
- C.

III. List the four uses of auxiliary views.

A.

B.

C.

D.

IV. Arrange six general steps, in order, that are used in constructing an auxiliary view.

A.

B.

C.

D.

E.

F.

V. List five types of lines that are used to make the shape of an object.

A.

B.

C.

D.

E.

VI. List the six views that a primary auxiliary can be projected.

A.

B.

C.

D.

E.

F.

VII. List the four types of object surfaces.

A.

B.

C.

D.

VIII. Write the dimensional relationship between views.

A.

B.

C.

IX. List the four places reference planes can be located.

A.

B.

C.

D.

AUXILIARY VIEW

ANSWERS TO TEST

I. A. The direction an object is being viewed.

B. To extend from one point to another point.

C. Extra view or views other than orthographic views.

D. At a 90° angle.

E. A common line from which measurements are taken.

F. A surface at an angle to another.

G. A surface on a radius or series of arcs.

H. A surface turned or positioned at an angle to two orthographic planes.

I. A view looking into the side of a surface.

J. A surface that is shown in its actual size.

K. Measuring location of points in one view and transferring to another view.

L. An instrument used to transfer distance measurements.

M. Light, temporary lines used to layout the rough shape of an object being drawn.

N. A view that shows only a part of the whole object.

O. The same size on both sides of a center line.

P. An auxiliary view can be drawn as a section through an area.

Q. An auxiliary projected from one of the primary views. (Top, front, side, etc.)

R. An auxiliary projected from a primary auxiliary.

S. A theoretical line between views where picture planes fold. (Used as a reference line)

T. A line that appears in its actual length.

II. A. Depth

B. Height

C. Width

III. A. True length of line

B. Point view of line

C. Edge view of plane

D. True size of plane

IV. A. Determine line of sight.

B. Introduce reference or fold lines.

C. Draw light projection lines.

D. Transfer points.

E. Determine visibility.

F. Complete the view.

V. A. Horizontal

B. Vertical

C. Inclined

D. Curved

E. Skewed

VI. A. Top

B. Front

C. Left side

D. Right side

E. Bottom

F. Back

VII. A. Normal

B. Inclined

C. Skewed

D. Curved

VIII. A. Same height

B. Same width

C. Same depth

IX. A. Back of view

B. Center of view

C. Front of view

D. Between views

SECTION J

UNIT X

MATERIALS

MATERIALS

TERMINAL OBJECTIVE

After completion of this unit, the student should be able to identify symbols and application of building materials. The student should be able to identify plumbing, heating and electrical symbols and figure out a bill of materials. This knowledge will be evidenced through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Match terms associated with building materials to the correct definition.

II. Identify the symbols and application of building materials.

III. Identify types of plumbing symbols.

IV. Identify heating symbols.

V. Identify types of electrical symbols.

VI. Discuss figuring a bill of materials.

MATERIALS

SUGGESTED ACTIVITIES

I. Instructor:

   A. Provide students with objective sheet.

   B. Provide students with information and assignment sheets.

   C. Prepare transparencies.

   D. Discuss terminal and specific objectives.

   E. Discuss information and assignment sheets.

   F. Demonstrate and discuss procedures outlined in assignment sheets.

   G. Give test.

II. Students:

   A. Read objective sheet.

   B. Study information sheet.

   C. Demonstrate the ability to identify and draw building materials, plumbing, heating and electrical outlets.

   D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

   A. Objectives

   B. Information sheets

   C. Transparency masters

      1. TM 1a - Building Materials Section & Elevated

      2. TM 1b - Building Materials Section & Elevated

      3. TM 2 - Plumbing Symbols

      4. TM 3 - Electrical Symbols

        5. TM 4 - Heating Symbols

    D. Assignment sheets

        1. Assignment sheet #1 - Drawing Building Material Symbols Plain and Elevated

        2. Assignment sheet #2 - Drawing Plumbing Symbols

        3. Assignment sheet #3 - Drawing Heating Symbols

        4. Assignment sheet #4 - Drawing Electricity Symbols

    E. Answers to assignment sheets

    F. Test

    G. Answers to test

II. References:

A. Hornung, W.J., Architectural Drafting, Englewood Cliffs, N.J., Prentice Hall Inc., 1971.

B. Jones, M.M., Shopwork On The Farm, New York, New York, McGraw Hill Book Co., Inc., 1982.

C. Walker, J.R., Exploring Drafting, South Holland, Illinois, The Goodheart Wilcox Co., Inc., 1972.

MATERIALS

INFORMATION SHEET

I. Terms and definitions:

A. PLAIN - As materials appear when looking down upon.

B. SECTION - Cut away view.

C. ELEVATION - As materials appear when looking from the side.

D. SYMBOLS - Something that stands for something else.

E. PLUMBING SYMBOLS - Symbols that pertain to pipe and fixtures concerned in the distribution and use of water in a building.

F. HEATING SYMBOLS - Symbols that pertain to heating equipment and accessories.

G. ELECTRICAL SYMBOLS - Symbols that peratin to electric lines, switches, outlets and units.

H. BILL of MATERIALS - Estimated amount of materials and cost of those materials to do a particular project.

I. BOARD FLEET - Method which usually is used to determine the quantity and price of lumber.

II. Symbols and application of building materials.

NOTE: Refer to TM 1a and TM 1b.

A. Wood rough

B. Wood finish

C. Brick common

D. Brick face or common

E. Brick fire

F. Concrete stone

G. Concrete cinder

H. Concrete block

I. Cement finish

INFORMATION SHEET

J. Stone

K. Stone rubble

L. Terracotta and hollow tile

M. Tile ceramic

N. Rock

O. Cinders

P. Sand

Q. Gravel

R. Plaster

S. Structural iron

T. Insulation

U. Flashing

V. Glass

W. Gypson block

X. Glass block

III. Types of plumbing symbols.

NOTE: Refer to TM 2

A. Soil pipe-frame wall

B. Cold water line

C. Hot water line

D. Refrigeration line

E. Water closet

F. Built in bathtub

G. Combination tub and sink

H. Bathtub

I. Hot water tank

INFORMATION SHEET

- J. Floor drain
- K. Gas line
- L. Shower drain
- M. Cleanout
- N. Pantry
- O. Shower
- P. Pipe chase-brick wall

IV. Heating symbols.

NOTE: Refer to TM 3

- A. Radiator
- B. Return line
- C. Return
- D. Elbow
- E. Vanes
- F. Convector projecting
- G. Supply line
- H. Riser
- I. Elbow-looking up
- J. Register
- K. Convector recessed
- L. Supply duct
- M. Return duct

V. Types of electrical symbols.

- A. Ceiling outlet
- B. Exit light outlet
- C. Wall switch-single

INFORMATION SHEET

4. Wall switch-triple
5. Weatherproof switch
6. Floor outlet
7. Telephone
8. Drop cord
9. Wall outlet
10. Wall switch-double
11. Fluorescent
12. Weatherproof convenience outlet
13. Duplex convenience outlet
14. Buzzer
15. Bell

VI. Bill of material.

A. Factors to consider
   1. Size
   2. Length, width and height
   3. Kind
   4. Total requirement list
   5. Job plans
   6. Description of unique materials
   7. Total price list on all materials
   8. Need

B. Board feet
   1. Measurement
   2. Amount of lumber in a piece 1 inch thick, 1 foot wide and 1 foot long.
   3. 1/12 of cu. ft.

INFORMATION SHEET

4. Formula:

$$\text{Board feet} = \frac{\text{No. of pieces X In. thick X In. wide X ft. long}}{12}$$

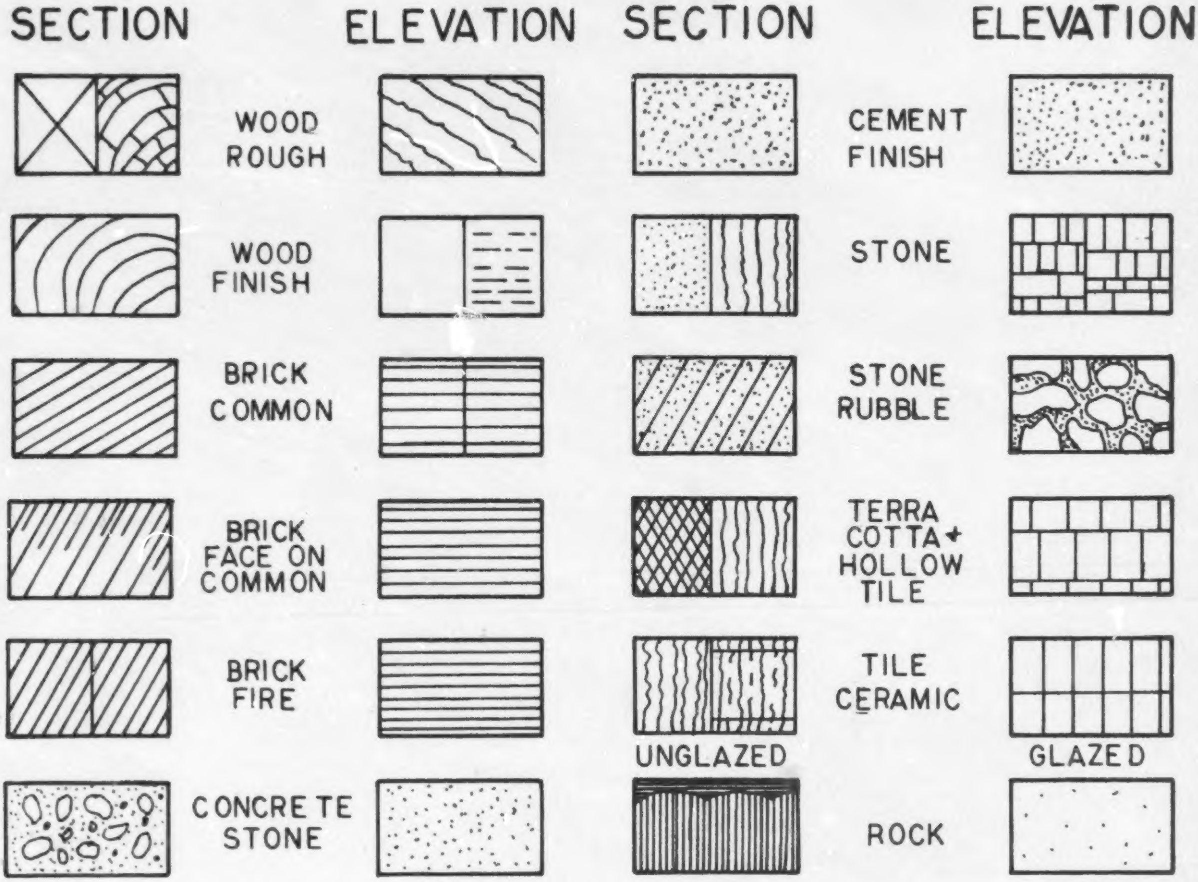
Example $\frac{4 \text{ X } 1 \text{ X } 6 \text{ X } 10}{12} = 20$

5. Mill-surface lumber is never full width or thickness due to the rough edges and faces of the boards being removed by planing.

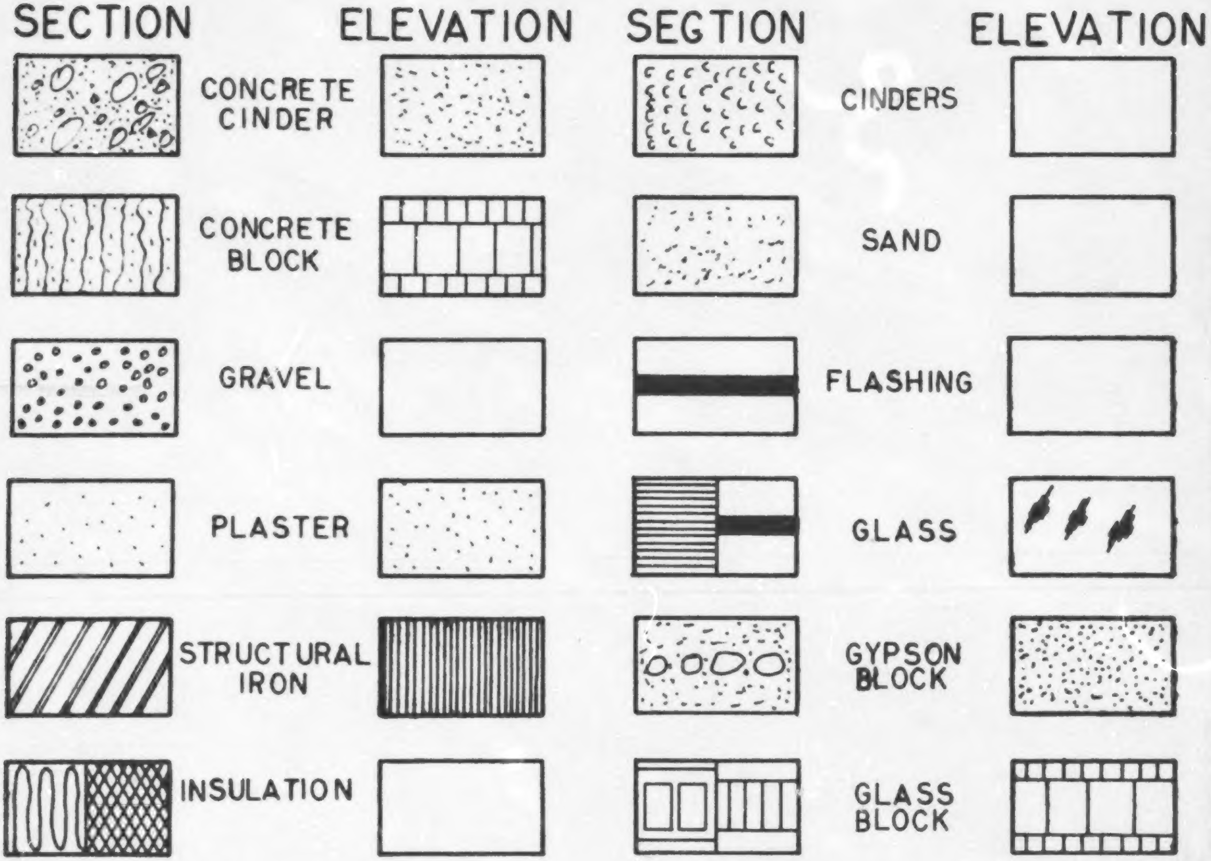
C. Determining the amount of lumber to cover a surface.

1. 1 by 12 boards allow 1/12 extra.
2. 1 by 10 boards allow 1/10 extra.
3. 1 by 8 boards allow 1/8 extra.
4. Tongue and groove allow 1/8 to 1/3 or more extra.

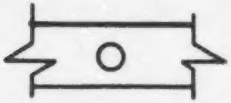
MATERIALS

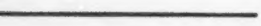

SECTION
ELEVATION
SECTION
ELEVATION
WOOD ROUGH
CEMENT FINISH
WOOD FINISH
STONE
BRICK COMMON
STONE RUBBLE
BRICK FACE ON COMMON
TERRA COTTA + HOLLOW TILE
BRICK FIRE
TILE CERAMIC
UNGLAZED
GLAZED
CONCRETE STONE
ROCK

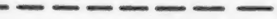
MATERIALS

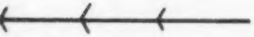

SECTION
ELEVATION
SEGTION
ELEVATION
CONCRETE CINDER
CINDERS
CONCRETE BLOCK
SAND
GRAVEL
FLASHING
PLASTER
GLASS
STRUCTURAL IRON
GYPSON BLOCK
INSULATION
GLASS BLOCK

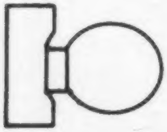
PLUMBING

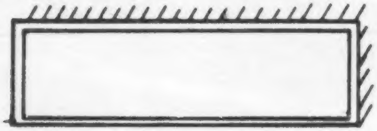

SOIL PIPE -
FRAME WALL

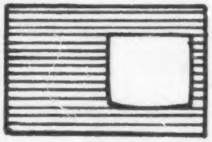

COLD WATER LINE

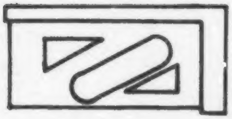

HOT WATER LINE

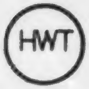

REFRIGERATOR LINE


WATER CLOSET

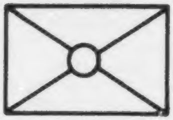

BUILT - IN
BATH TUB

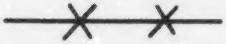

SINGLE SINK

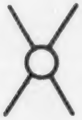

BATH TUB

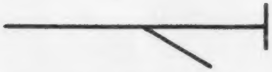


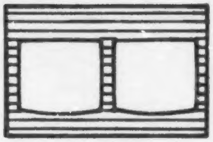
HOT WATER TANK

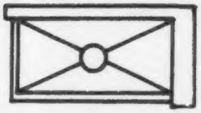

FLOOR DRAIN

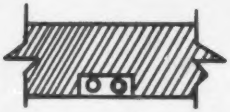

GAS LINE


SHOWER DRAIN

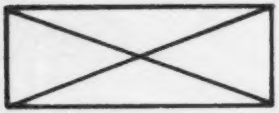

CLEANOUT

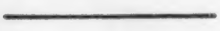

DOUBLE SINK

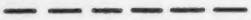

SHOWER

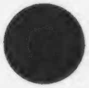

PIPE CHASE -BRICK WALL

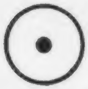
HEATING

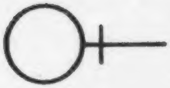

RADIATOR

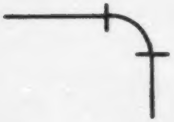

SUPPLY LINE

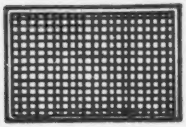

RETURN LINE

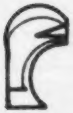

RISER

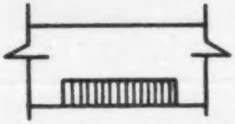

RETURN

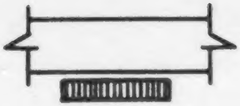

ELBOW-LOOKING UP

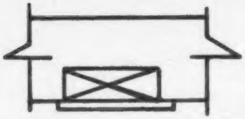

ELBOW

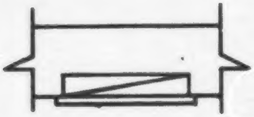

REGISTER


VANES

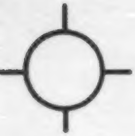

CONVECTOR RECESSED

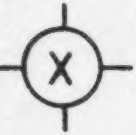

CONVECTOR PROJECTING


SUPPLY DUCT

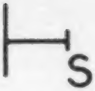

RETURN DUCT

ELECTRICITY

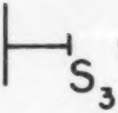

CEILING OUTLET



EXIT LIGHT OUTLET

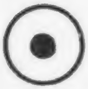


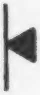
WALL SWITCH -SINGLE

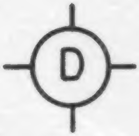


WALL SWITCH - TRIPLE

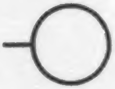
S_{WP} WEATHERPROOF SWITCH

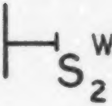

FLOOR OUTLET


TELEPHONE

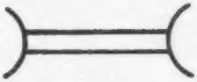


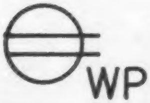
DROP CORD


WALL OUTLET

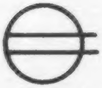


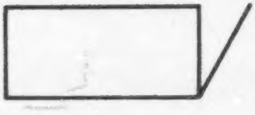
WALL SWITCH - DOUBLE

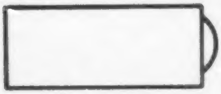

FLUORESCENT LIGHT



WEATHERPROOF
CONVEIENCE OUTLET


DUPLEX CONVENIENCE
OUTLET


BUZZER


BELL

MATERIALS

ASSIGNMENT SHEET #1 - DRAWING BUILDING MATERIAL SYMBOLS PLAIN AND ELEVATED

Instructions: Draw to the best of your ability the following material symbols plain and elevated. Refer to TM 1a and TM 1b.

PLAIN		ELEVATION
	WOOD ROUGH	
	BRICK COMMON	
	CONCRETE STONE	
	STONE	
	ROCK	
	SAND	

	GRAVEL	
	SAND	

Turn in to instructor for evaluation.

MATERIALS

ASSIGNMENT SHEET #2 - DRAWING PLUMBING SYMBOLS

Instructions: Draw to the best of your ability the following plumbing symbols. Refer to TM 2

DRAWINGS

1. SOIL - PIPE FRAME WALL
2. COLD WATER LINE
3. HOT WATER LINE
4. REFRIGERATOR LINE
5. WATER CLOSET
6. BUILT-IN BATHTUB
7. COMBINATION TUB AND SINK
8. BATHTUB
9. HOT WATER TANK
10. FLOOR DRAIN
11. GAS LINE
12. SHOWER DRAIN
13. CLEAN OUT
14. PANTRY

DRAWINGS

15. SHOWER

16. PIPE CHASE-BRICK WALL

Turn in to instructor for evaluation.

MATERIALS

ASSIGNMENT SHEET #3 - DRAWING HEATING SYMBOLS

Instructions: Draw to the best of your ability the following heating symbols.Refer to TM 3

DRAWINGS

1. RADIATOR
2. RETURN LINE
3. RETURN
4. ELBOW
5. VANES
6. CONVECTOR PROJECTING
7. SUPPLY LINE
8. RISER
9. ElBOW-LOOKING UP
10. REGISTER
11. CONVECTOR RECESSED
12. SUPPLY DUCT
13. RETURN DUCT

Turn in to instructor for evaluation.

MATERIALS

ASSIGNMENT SHEET #4 - DRAWING ELECTRICITY SYMBOLS

Instructions: Draw to the best of your ability the following electricity symbols. Refer to TM 4

DRAWINGS

1. CEILING OUTLET

2. EXIT LIGHT OUTLET

3. WALL SWITCH-SINGLE

4. WALL SWITCH-TRIPLE

5. WEATHERPROOF SWITCH

6. FLOOR OUTLET

7. TELEPHONE

8. DROP CORD

9. WALL OUTLET

10. WALL SWITCH-DOUBLE

11. FLUORESCENT LIGHT

12. WEATHERPROOF CONVENIENCE OUTLET

DRAWINGS

13. DUPLEX CONVENIENCE OUTLET

14. BUZZER

15. BELL

Turn in to instructor for evaluation.

MATERIALS

ANSWERS TO ASSIGNMENT SHEETS

Assignment sheet #1

Refer to TM 1a and TM 1b

Assignment sheet #2

Refer to TM 2

Assignment sheet #3

Refer to TM 3

Assignment sheet #4

Refer to TM 4

MATERIALS

TEST

I. Match the following terms associated with building materials to the correct definition.

___1. Plain

___2. Section

___3. Elevation

___4. Symbols

___5. Plumbing Symbols

___6. Heating Symbols

___7. Electricity Symbols

___8. Bill of Materials

___9. Board Feet

A. Cut away view.

B. Symbols that pertain to heating equipment and accessories.

C. Symbols that pertain to electric lines, switches, outlets and units.

D. Symbols that pertain to pipe and fixtures concerned in the distribution and use of water in a building.

E. As materials appear when looking down upon.

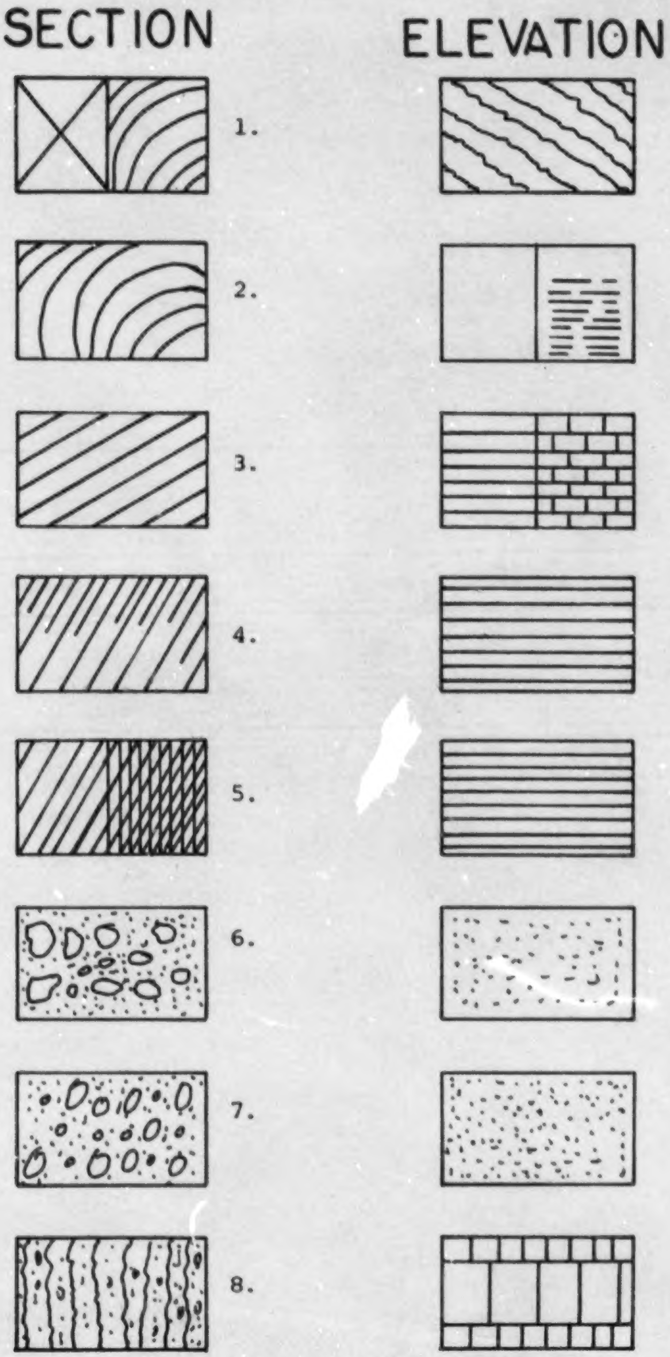
F. As materials appear when looking from the side.

G. Method which is usually used to determine the quantity and price of lumber.

H. Estimated amount of materials and cost of those materials to do a particular project.

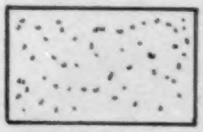
I. Something that stands for something else.

II. Identify the symbols and application of 22 of the following building materials.

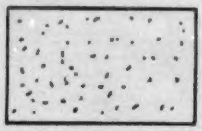

SECTION
ELEVATION
1.
2.
3.
4.
5.
6.
7.
8.

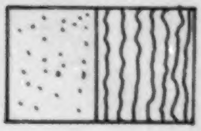
Identify the following building material symbols.

SECTION ELEVATION



9.





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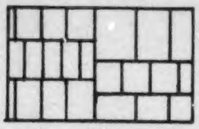

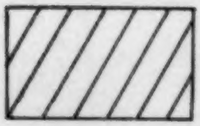

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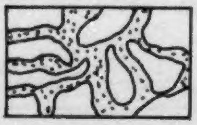
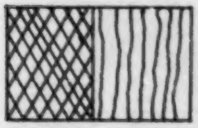
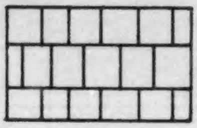
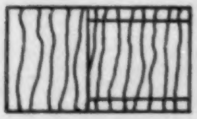


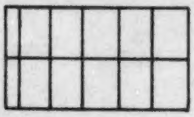


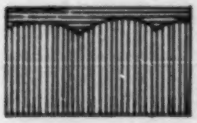
12.



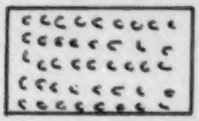


13.

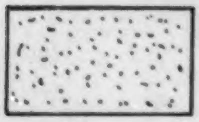




14.

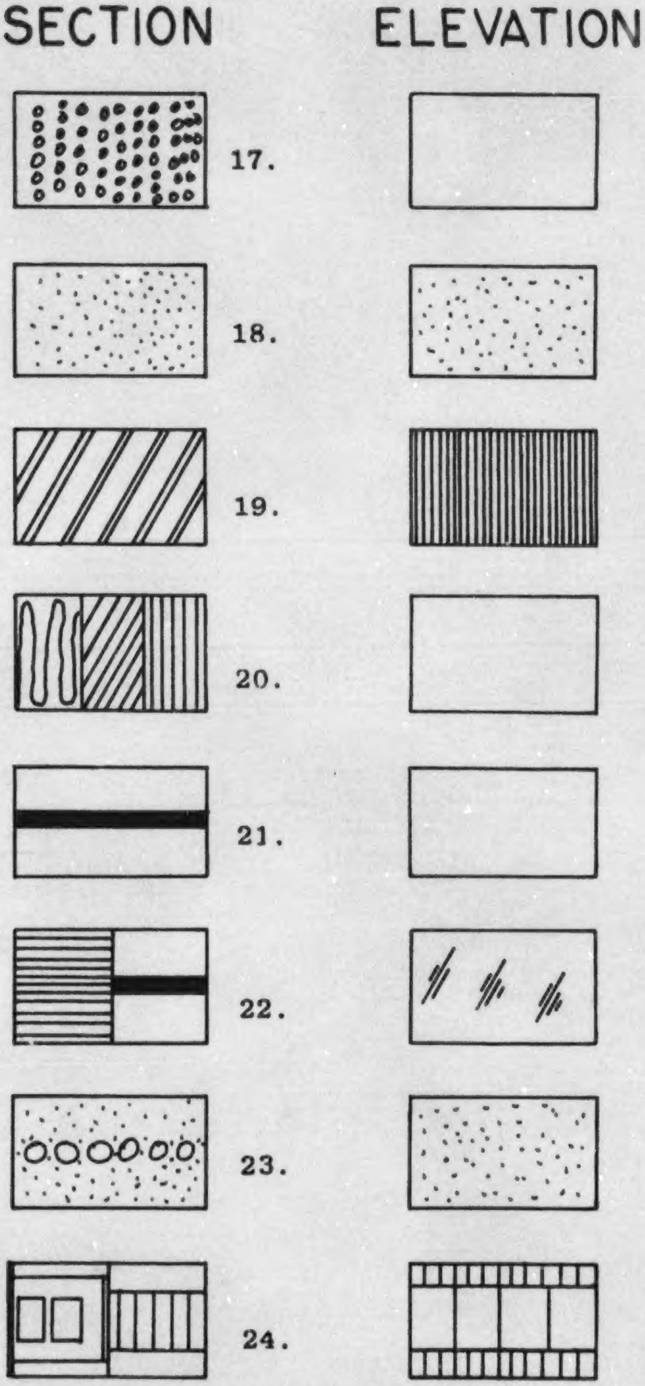


15.

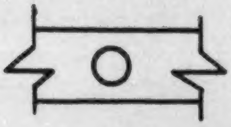


16.

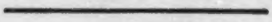
Identify the following materials symbols.


SECTION
ELEVATION
17.
18.
19.
20.
21.
22.
23.
24.

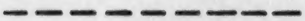
III. Identify the following plumbing symbols



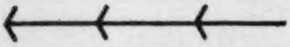
1. ____________________



2. ____________________



3. ____________________



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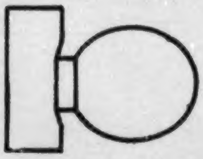

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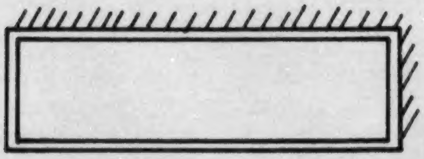

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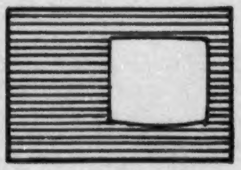
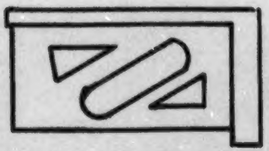


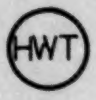
7. ____________________



8. ____________________

Identify the following plumbing symbols.

9.



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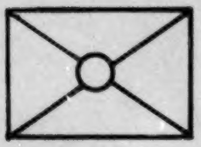

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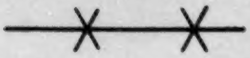

11. ____________________

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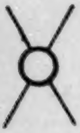
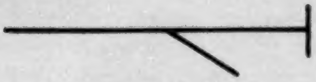


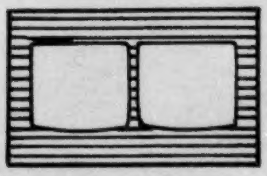
12. ____________________

13.



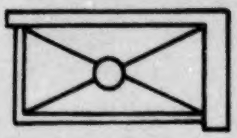
13. ____________________

14.



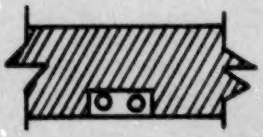
14. ____________________

15.



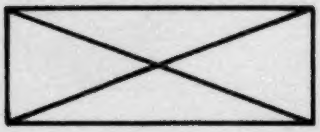
15. ____________________

16.

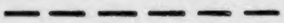


16. ____________________

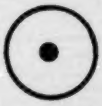
IV. Identify the following heating symbols.

1. 

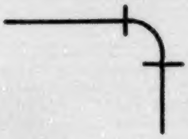
1. ______________________________

2. 

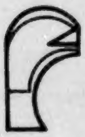
2. ______________________________

3. 

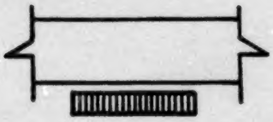
3. ______________________________

4. 

4. ______________________________

5. 

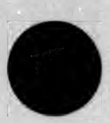
5. ______________________________

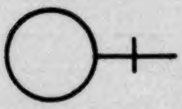
6. 

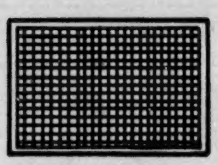
6. ______________________________

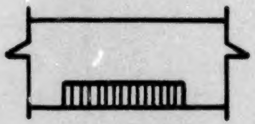
Identify the following heating symbols.

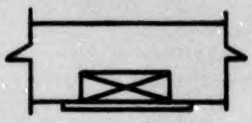
7. ____________ 7. ____________

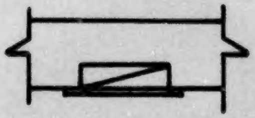
8.  8. ____________

9.  9. ____________

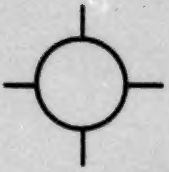
10.  10. ____________

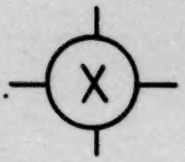
11.  11. ____________

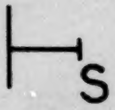
12.  12. ____________

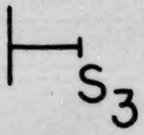
13.  13. ____________

V. Identify the following electrical symbols.

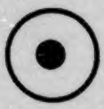
1. 

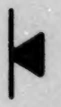
2. 

3. 

4. 

5. S_{WP}

6. 

7. 

1. ______________________

2. ______________________

3. ______________________

4. ______________________

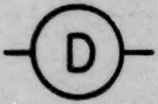
5. ______________________

6. ______________________

7. ______________________

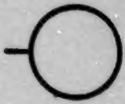
Identify the following electrical symbols.

8.



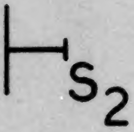
8. ____________________

9.



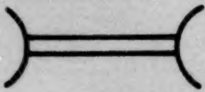
9. ____________________

10.



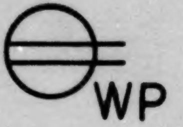
10. ____________________

11.



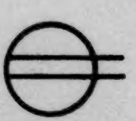
11. ____________________

12.



12. ____________________

13.



13. ____________________

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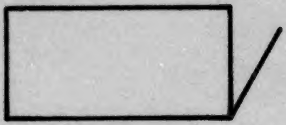

14. ____________________

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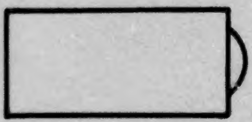


15. ____________________

VI. Discuss in writing figuring a bill of materials.

MATERIALS

ANSWERS TO TEST

I. 1. E

2. A

3. F

4. I

5. D

6. B

7. C

8. H

9. G

II. 1. Wood rough

2. Wood finish

3. Brick common

4. Brick face or common

5. Brick fire

6. Concrete stone

7. Concrete cinder

8. Concrete block

9. Cement finish

10. Stone

11. Stone rubble

12. Terracotta and hollow tile

13. Tile ceramic

14. Rock

15. Cinders

16. Sand

17. Gravel

18. Plaster

19. Structural iron

20. Insulation

21. Flashing

22. Glass

23. Gypson block

24. Glass block

III. 1. Soil pipe-frame wall
2. Cold water line
3. Hot water line
4. Refrigeration line
5. Water closet
6. Built-in bathtub
7. Combination tub and sink
8. Bathtub
9. Hot water tank
10. Floor drain
11. Gas line
12. Shower drain
13. Cleanout
14. Pantry
15. Shower
16. Pipe chase-brick wall

IV. 1. Radiator
2. Return line
3. Return
4. Elbow
5. Vanes
6. Convector projecting
7. Supply line
8. Riser
9. Elbow-looking up
10. Register
11. Convector recessed
12. Supply duct
13. Return duct

V. 1. Ceiling outlet
2. Exit light outlet
3. Wall switch-single
4. Wall switch-triple
5. Weatherproof switch
6. Floor outlet
7. Telephone
8. Drop cord
9. Wall outlet
10. Wall switch-double
11. Fluorescent light
12. Weatherproof convenience outlet
13. Duplex convenience outlet
14. Buzzer
15. Bell

VI. A. Factors to consider
  1. Size
  2. Length, width and height
  3. Kind

4. Total requirement list

5. Job plans

6. Description of unique materials

7. Total price list on all materials

8. Need

B. Board feet

1. Measurement

2. Amount of lumber in a piece 1 inch thick, 1 foot wide and 1 foot long.

3. 1/12 of cu. ft.

4. Formula:

$$\text{Board feet} = \frac{\text{No. of pieces X In. thick X In. wide X ft. long}}{12}$$

5. Mill-surface lumber is never full width or thickness, due to the rough edges and faces of the boards being removed by planing.

C. Determining the amount of lumber to cover a surface.

1. 1 by 12 boards allow 1/12 extra.

2. 1 by 10 boards allow 1/10 extra.

3. 1 by 8 boards allow 1/8 extra.

4. Tongue and groove allow 1/8 to 1/3 or more extra.

SECTION K

UNIT XI

FOUNDATIONS

FOUNDATIONS

TERMINAL OBJECTIVE

After completion of this unit, the student should be able to recognize and draft basic foundation drawings. This knowledge will be evidenced through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

I. Match terms associated with drawing foundations to the correct definition.

II. List six factors to consider in drawing concrete floor studs.

III. List five general rules when dealing with expansion and construction in foundation drawings.

IV. Discuss damp-proofing.

V. List six steps to consider in drawing concrete slabs on foundation walls.

VI. List steps to be considered in drawing concrete slabs against foundation walls.

VII. Draw the following footings.

  A. Integral wall footings

  B. Footings for wood posts

  C. Columns on spread footings

VIII. Draw the following side view of a concrete foundation.

IX. Draw the following top view of a concrete foundation.

FOUNDATIONS

SUGGESTED ACTIVITIES

I. Instructor:

- A. Provide students with objective sheet.
- B. Provide students with information and assignment sheets.
- C. Prepare transparencies.
- D. Discuss unit and specific objectives.
- E. Discuss information sheets.
- F. Discuss assignment sheets.
- G. Give test.

II. Student:

- A. Read objectives.
- B. Study information sheets.
- C. Work assignment sheets.
- D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

- A. Objective sheets
- B. Information sheet
- C. Transparency masters
  - 1. TM 1 - Protection Against The Elements
    - a. Concrete Floor Studs
    - b. Expansion and Contraction
    - c. Damp-proofing

2. TM 2 - Wall Fittings
    a. On Wall
    b. Against Wall

D. Assignment sheets
    1. Assignment sheet #1 - Draw the Following Footings
        A. Integral Wall Footings
        B. Footings for Wood Posts
        C. Columns on Spread Footings
    2. Assignment sheet #2 - Drawing Side Views of Concrete Foundations
    3. Assignment sheet #3 - Drawing Top Views of Concrete Foundations

E. Test

F. Answers to test

II. References:

A. Hornung, W.J., Architectural Drafting, Englewood Cliffs, New Jersey, Prentice Hall Inc., 1971.

B. Jones, Mack M., Shop Work On The Farm, New York, New York, McGraw Hill Book Co., Inc., 1955.

FOUNDATIONS

INFORMATION SHEET

I. Terms and definitions:

- A. FOUNDATION - Base; the supporting part of a wall, house, farm building, etc.
- B. FOOTING - Part of the foundation that supports the wall.
- C. EXPANSION - To enlarge.
- D. CONTRACTION - To draw up.
- E. DAMP-PROOFING - Materials used to help prevent the entrance of moisture.
- F. REINFORCING ROD - Metal rods used to straighten concrete.
- G. ANCHOR BOLTS - Bolts used to tie corners together.

II. Factors to consider in drawing concrete floor studs.

- A. Cinder or gravel fill
- B. Wetted down
- C. Well tamped
- D. Layer of roofing felt or waterproof fabric
- E. Tar layer
- F. Insulation

Refer to TM 1 (Example A)

III. General rules when dealing with expansion and contraction in foundation drawings. Refer to TM 1 (Example B)

- A. Expansion joints
- B. Bonding of walls
- C. Steel reinforced belts
- D. Tar joints
- E. Beveled siding

INFORMATION SHEET

IV. Damp-proofing. Refer to TM 1 (Example C)

A. Foundations require damp-proofing especially where soil conditions or drainage problems exist.

B. To prevent water leakage or damage, a build up coat of tar or tar paper should be applied to outside of foundation.

C. Damp-proofing should be applied from the top of the footing to a point above the grade line.

V. Six steps to consider in drawing concrete slab on foundation walls.

A. 12" cinder or stone fill

B. 8" concrete slab

C. Strength of foundation wall

D. 12" wall at slab level

E. Reinforcing rods in slab

F. Strength footings

VI. Steps to be considered in drawing concrete slab against foundation walls.

A. 12" cinder or stone fill

B. 8" concrete slab

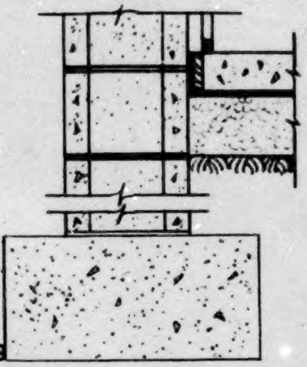
C. 8" wall

D. Reinforcing rods in slab

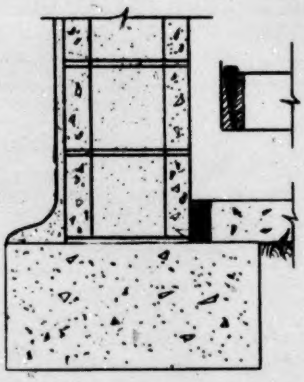
E. Strength of footing

F. Anchor bolts

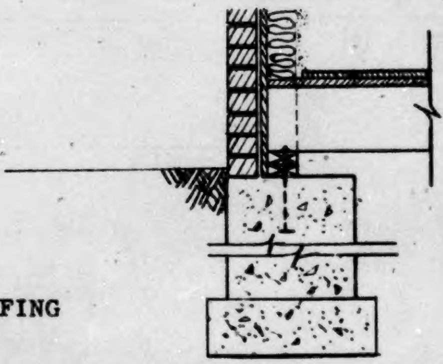
PROTECTION AGAINST THE ELEMENTS



A. CONCRETE FLOOR STUDS



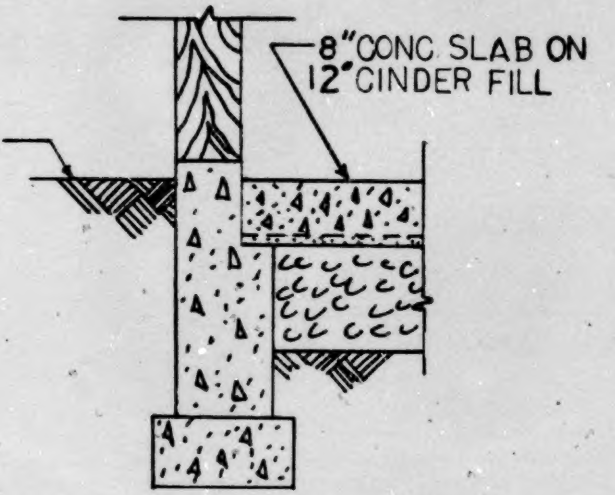
B. EXPANSION AND
CONTRACTION



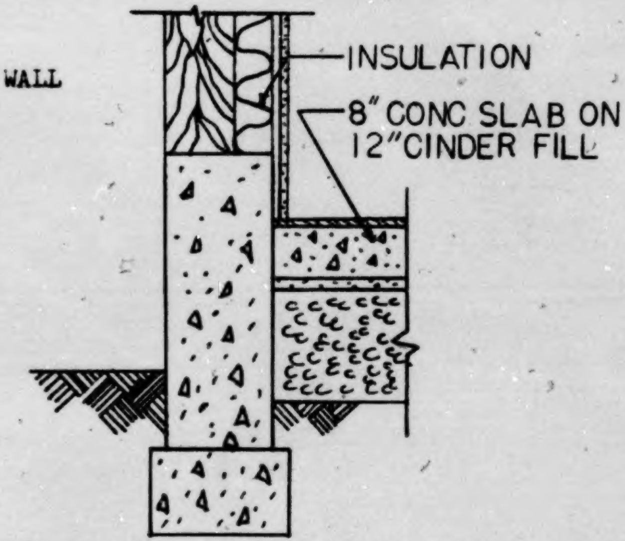
C. DAMP-PROOFING

WALL FITTINGS

A. ON WALL


8" CONC SLAB ON
12" CINDER FILL
GRADE

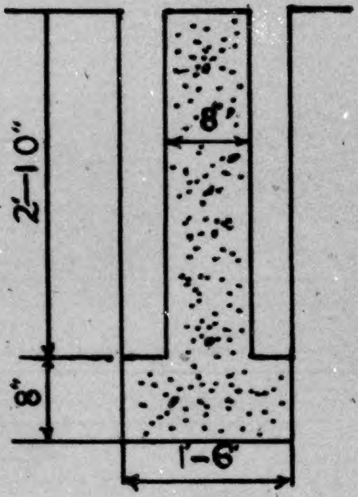
B. AGAINST WALL

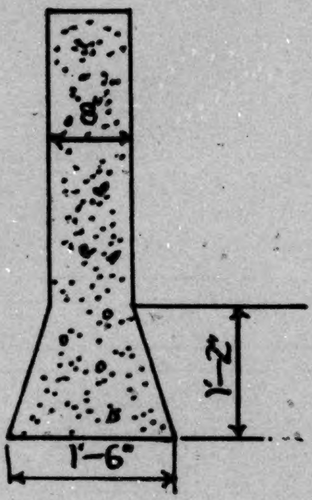

INSULATION
8" CONC SLAB ON
12" CINDER FILL

FOUNDATION

ASSIGNMENT SHEET #1 - INTEGRAL WALL FOOTING

Instruction: Draw to the best of your ability on the paper below the examples shown of integral wall footings.

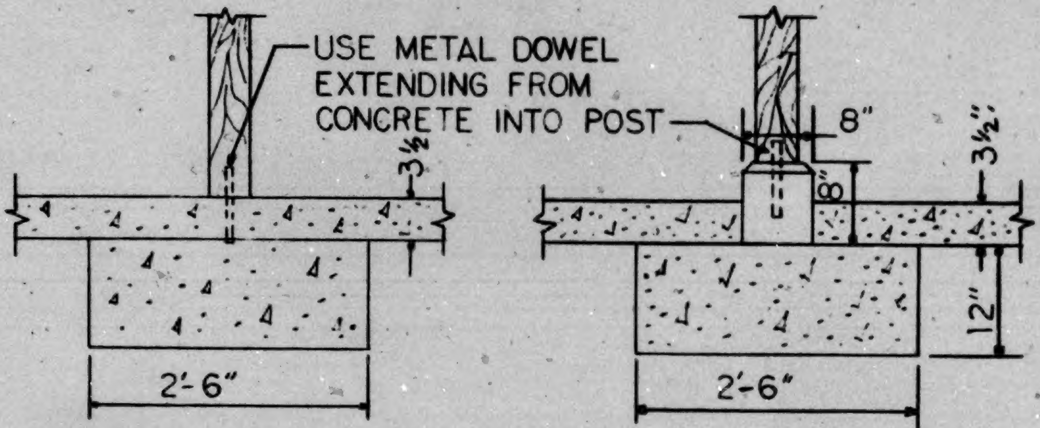




FOUNDATION

ASSIGNMENT SHEET #1-B - FOOTINGS FOR WOOD POST

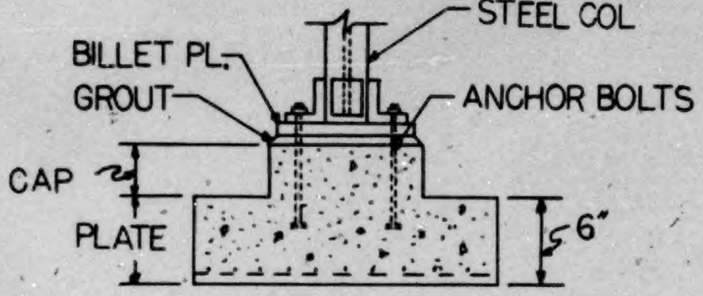
Instructions: Draw to the best of your ability on the paper below the examples shown of footings for wood posts.
Use scale 1" = 1'.

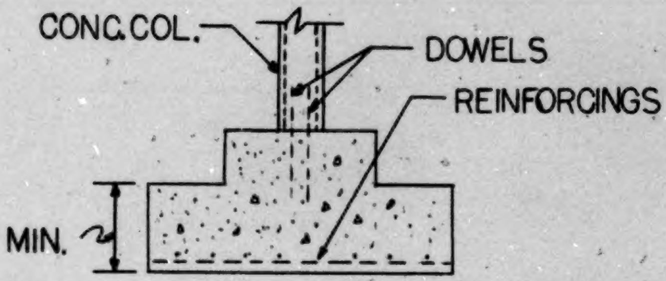

USE METAL DOWEL
EXTENDING FROM
CONCRETE INTO POST
3½
2'-6"
8"
3½"
8"
12"
2'-6"

FOUNDATION

ASSIGNMENT SHEET #1-C - COLUMNS ON SPREAD FOOTINGS

Instructions: Draw to the best of your ability on the paper below the examples shown of column on spread footing.


STEEL COL
BILLET PL.
GROUT
ANCHOR BOLTS
CAP
PLATE
6"

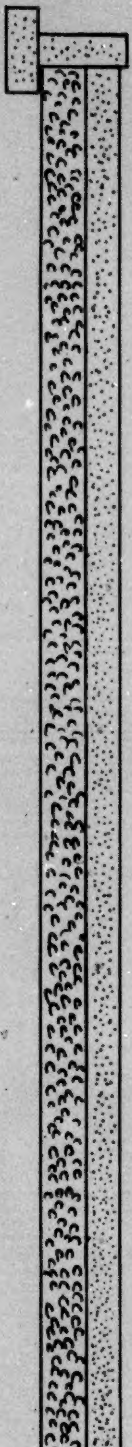

CONC. COL.
DOWELS
REINFORCINGS
MIN.

FOUNDATION

ASSIGNMENT SHEET #2 - DRAWING SIDE VIEWS OF CONCRETE FOUNDATIONS

Instructions: Draw to the best of your ability the footing and concrete slab shown on this paper.

Use scale of ½" =1'.

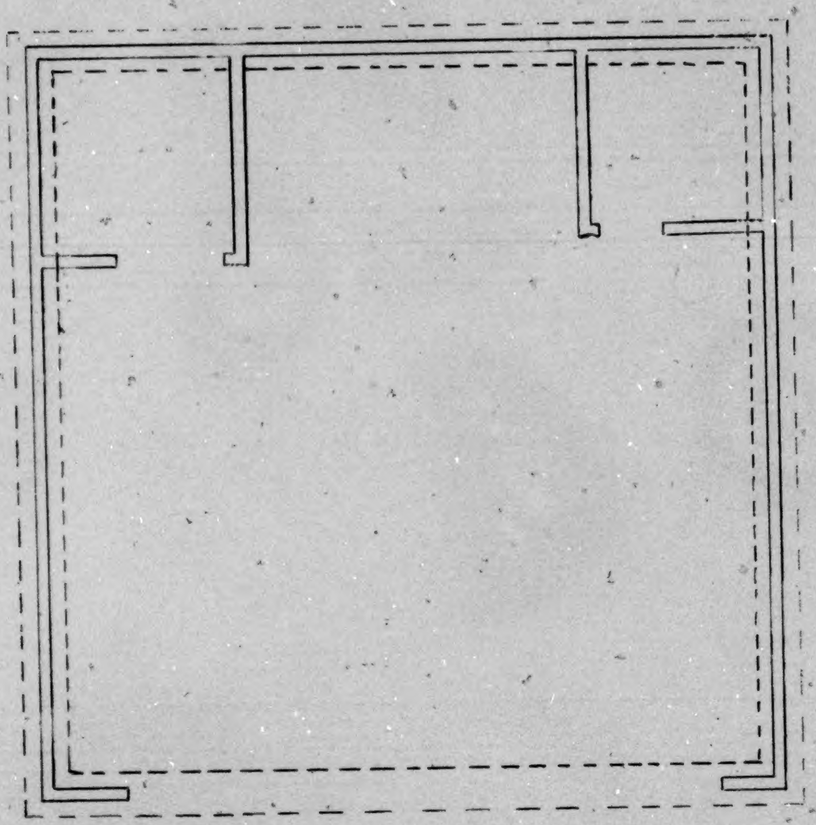


FOUNDATION

ASSIGNMENT SHEET #3 - DRAWING TOP VIEW OF CONCRETE FOUNDATIONS

Instructions: Draw to the best of your ability the top view of the concrete foundation shown below.

Use scale of 1/8" = 1'.



FOUNDATION

TEST

I. Match terms associated with drawing foundation to the correct definition.

A. Foundation
B. Footing
C. Expansion
D. Contraction
E. Damp-proofing
F. Reinforcing Rod and Bolts
G. Anchor Bolts

1. To enlarge
2. Part of the foundation that supports the wall.
3. Bolts used to tie corners together.
4. Metal rods used to strenghten concrete.
5. Base; the supporting part of a wall, house, farm building, etc.
6. To draw up.
7. Materials used to help prevent moisture.

II. List six factors to consider in drawing concrete floor studs.

A.

B.

C.

D.

E.

F.

III. List five general rules when dealing with expansion and construction in foundation drawings.

A.

B.

C.

D.

E.

IV. Discuss damp-proofing.

V. List six steps to consider in drawing concrete slab on foundation walls.

A.

B.

C.

D.

E.

F.

VI. List six steps to be considered in drawing concrete slab against against foundation walls.

A.

B.

C.

D.

E.

F.

VII. Turn in assignment sheets 1A, 1B and 1C to instructor.

VIII. Turn in assignment sheet #2 to instructor.

IX. Turn in assignment sheet #3 to instructor.

FOUNDATION

ANSWERS TO TEST

I. A. 5

B. 2

C. 1

D. 6

E. 7

F. 4

G. 3

II. A. Cinder or gravel fill

B. Wetted down

C. Well tamped

D. Layer of roofing felt or waterproof fabric

E. Tar layer

F. Insulation

III. A. Expansion joints

B. Bonding of walls

C. Steel reinforced belts

D. Tar joints

E. Beveled siding

IV. Discussion should include:

A. Foundations require damp-proofing especially where soil conditions or drainage problems exist.

B. To prevent water leakage or damage, a build up coat of tar or tar paper should be applied to outside of foundation.

C. Damp-proofing should be applied from the top of the footing to a point above the grade line.

V. A. 12" cinder or stone fill
   B. 8" concrete slab
   C. Strength of foundation wall
   D. 12" wall at slab level
   E. Reinforcing rods in slab
   F. Strength footings

VI. A. 12" cinder or stone fill
   B. 8" concrete slab
   C. 8" wall
   D. Reinforcing rods in slab
   E. Strength of footing
   F. Anchor bolts

VII. To be determined by instructor.

VIII. To be determined by instructor.

IX. To be determined by instructor.

SECTION L

UNIT XII

DESIGNING FARM BUILDINGS

DESIGNING FARM BUILDINGS

TERMINAL OBJECTIVE

After completion of this unit, the student should be familiar with terms and definitions, drawing basic frameworks and designing simple farm structures. The student should be able to evidence this ability to draw structural drawings through demonstration and by scoring at least eighty-five percent on the unit test.

SPECIFIC OBJECTIVES

I. Match terms associated with structural design to the correct definition.

II. List seven factors to consider when designing floors.

III. List rules necessary in designing a wall.

IV. List factors to consider when designing a roof.

V. Name ten types of insulation.

VI. List rules to be concerned with as to space utilization in designing farm structures.

VII. Name ten specifications found on door schedule.

VIII. Name nine specifications found on window schedule.

IX. Discuss blueprint.

X. Name drawings that should be included in a major farm building.

DESIGNING FARM BUILDINGS

SUGGESTED ACTIVITIES

I. Instructor:

  A. Provide students with objective sheet.

  B. Provide students with information and assignment sheets.

  C. Prepare transparencies.

  D. Discuss terminal and specific objectives.

  E. Discuss information sheets.

  F. Demonstrate and discuss procedures outlined in assignment sheets.

  G. Give test.

II. Students:

  A. Read objective sheet.

  B. Study information sheets.

  C. Demonstrate the ability to accomplish the procedures outlined in the assignment sheet.

  D. Take test.

INSTRUCTIONAL MATERIALS

I. Included in this unit:

  A. Objective sheet

  B. Information sheet

  C. Transparency masters

    1. TM 1 - Roofs

    2. TM 2 - Door Schedule

    3. TM 3 - Window Schedule

    4. TM 4 - Floor Plan

5. TM 5 - Electric Plan
6. TM 6 - Foundation (Side View)
7. TM 7 - Foundation (Top View)
8. TM 8 - Types of Construction
9. TM 9 - Structure (Top View)
10. TM 10- Structure (Roof)
11. TM 11- Side and End Views of a Farm Structure
12. TM 12- Side and End View of a Farm Structure

D. Assignment sheets

1. Assignment sheet #1 - Drawing a Greenhouse
2. Assignment sheet #2 - Design and Draw a Farm Building

E. Answers to assignment sheets.

F. Test

G. Answers to test

II. References:

A. Spillman, Cramer, Curtis, Hellickson, Mangold, Meador, Pratt and Stombaugh. Structures and Environment Handbook, Ames, Iowa, Midwest Plan Service, 1975.

B. W.J. Hornung, Architectural Drafting, Englewood Cliffs, N.J. Prentice Hall Inc., 1971.

C. Geisecke, Mitchell, Spencer and Hill., Technical Drawing, New York, New York, MacMillan Publishing Co., Inc., 1974.

D. Hartman, W.J., Basic Drafting, Stillwater, Oklahoma, State Department of Vocational and Technical Education, 1972.

E. Boyd, J.S., Practical Farm Building, Danville, Illinois, Interstate Printers and Publishers, Inc., 1973.

DESIGNING FARM BUILDINGS

INFORMATION SHEET

I. Terms and definitions:

- A. ROOF - The upper covering of a building.
- B. INSULATION - Materials used to retain or repel heat or cold.
- C. SPACE UTILIZATION - Ability to use space available to the maximum potential.
- D. DEAD LOADS - Weight of all materials used in the building construction such as floor, roof, etc.
- E. SNOW AND ICE LOADS - Weight of ice, snow and water accumulated in an undrifted condition on flat exposed ground surfaces.
- F. WIND LOADS - Weight of wind action such as tornadoes.
- G. COMBINATION LOADS - Weight placed on a structure from more than one load at any one time.
- H. SPECIFICATION - A detailed plan or proposal for something.
- I. BLUEPRINT - A photographic print in white on a bright blue ground used in drawing and architects plans.

II. Seven factors in designing floors.

- A. Footing and foundation
- B. Quality of materials
- C. Strength of materials
- D. Weight on floor
- E. Wear on floor
- F. Life of floor
- G. Cost

III. Rules necessary in designing a wall.

- A. Specifications

INFORMATION SHEET

B. Quality of materials

C. Strength of materials

D. Insulation

E. Plumbing, heating, wiring outlets

F. Cost

IV. Factors to consider when designing a roof. Refer to TM 1

A. Style

1. Lean-to
2. Flat
3. Gambral
4. Gable
5. Mansard
6. Hip

B. Material

1. Wood shingles
2. Asphalt
3. Galvanized iron
4. Metal
5. Fiberglass
6. Aluminum

C. Load strength

1. Dead
2. Snow and ice
3. Wind
4. Combination

D. Specification

INFORMATION SHEET

E. Cost

V. Ten types of insulation.

A. Loose fill

B. Blanket

C. Batt

D. Rigid

E. Slab

F. Reflective

G. Native materials

H. Vapor barriers

I. Blow in

J. Foam

VI. Space utilization

A. Reduce hallways

B. Make proper use of all available space.

C. Organize building

D. Avoid unnecessary luxuries

E. Buildings should be designed in a way that will allow the structures to be used for many jobs, events, activities, etc.

F. Equiped with easily set up and stored equipment.

G. Safe

H. Economical

VII. Ten specifications found on door schedules.

A. Width

B. Length

C. Thickness

INFORMATION SHEET

- D. Materials
- E. Type
- F. Screen
- G. Quantity
- H. Threshold
- I. Finish
- J. Manufacturer

VIII. Nine specifications found on window schedule.

- A. Width
- B. Height
- C. Materials
- D. Type
- E. Screen
- F. Quantity
- G. Remarks
- H. Manufacturer
- I. Catalog

IX. Blueprint

- A. Used as the last source in determining how to construct a structure.
- B. Drawings:
  - 1. Floor plan
  - 2. Foundation plan
  - 3. Structural plan
  - 4. Top view
  - 5. Side view
  - 6. End view

INFORMATION SHEET

- C. Symbols
    - 1. Electrical
    - 2. Plumbing
    - 3. Heating
    - 4. Materials
    - 5. Doors
    - 6. Windows
- X. Drawings of a major farm building.
    - A. Floor plan
        - 1. Walls
        - 2. Plumbing
        - 3. Windows
        - 4. Doors
        - 5. Specifications Refer to TM 4
    - B. Electrical
        - 1. Outlets
        - 2. Wire
        - 3. Heat and cooling
    - C. Foundation
        - 1. Footings
        - 2. Slabs
        - 3. Specifications Refer to TM 6 & 7
    - D. Structural
        - 1. Frameworks
        - 2. Specifications Refer to TM 8

INFORMATION SHEET

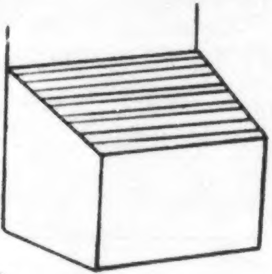
E. Top views Refer to TM 9 & 10

  1. Structural
  2. Roof
  3. Specifications

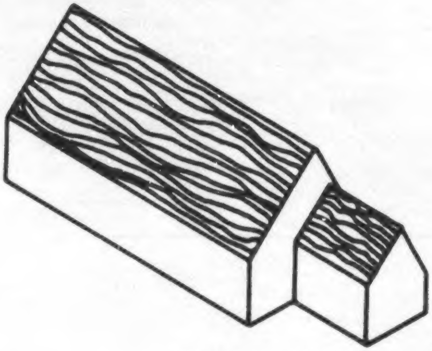
F. Side and end views Refer to TM 11 & 12

  1. Outside view of buildings
  2. Specifications

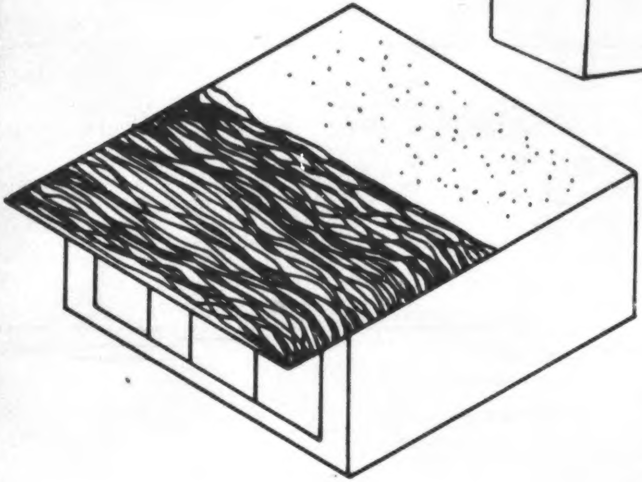
ROOFS



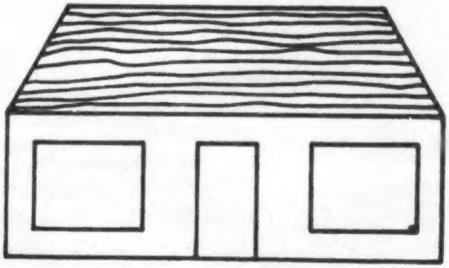
LEAN-TO



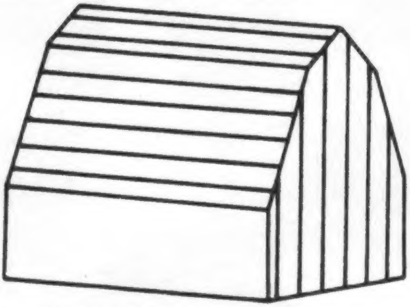
GABLE ROOF



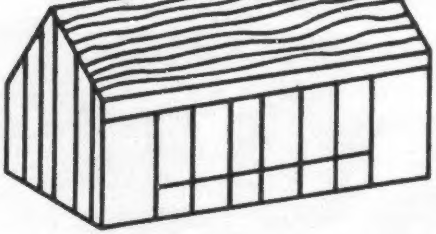
FLAT SLOPE ROOF



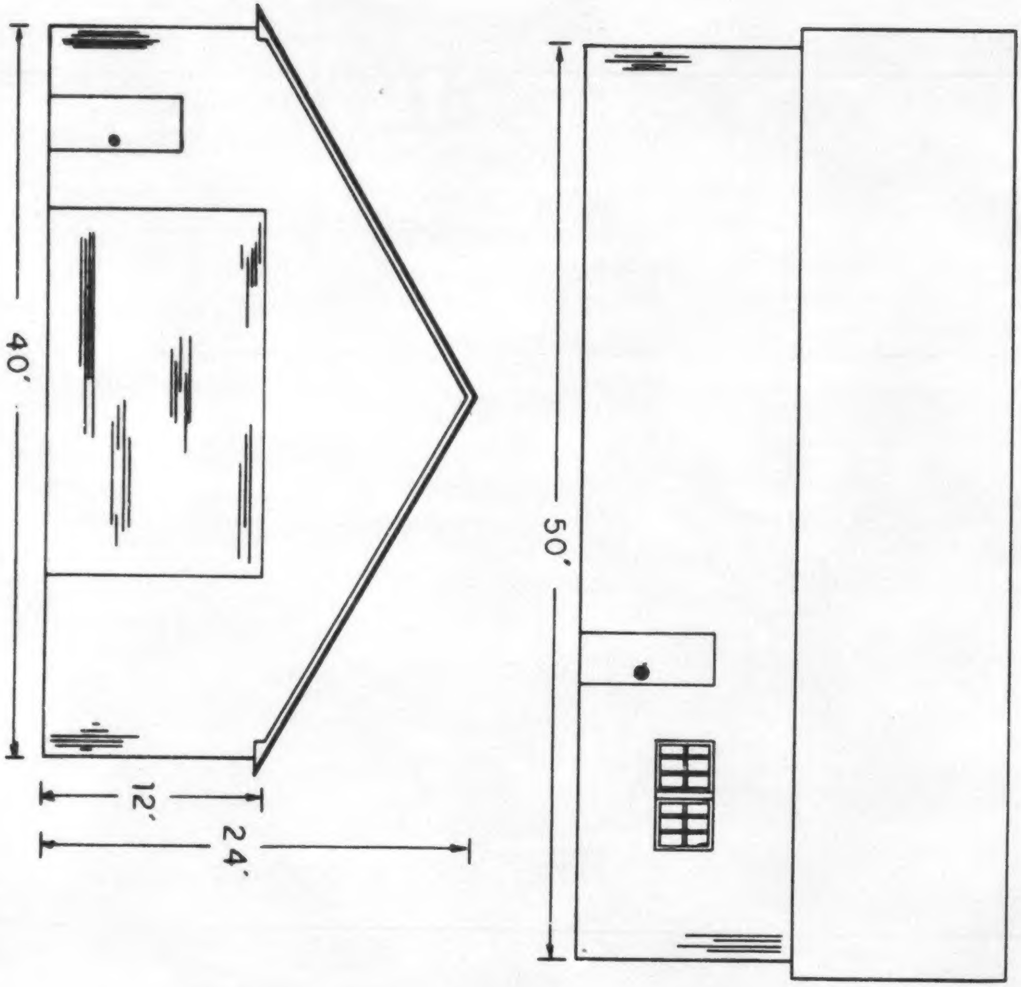
MANSARD (OBSOLETE)



GAMBREL ROOF



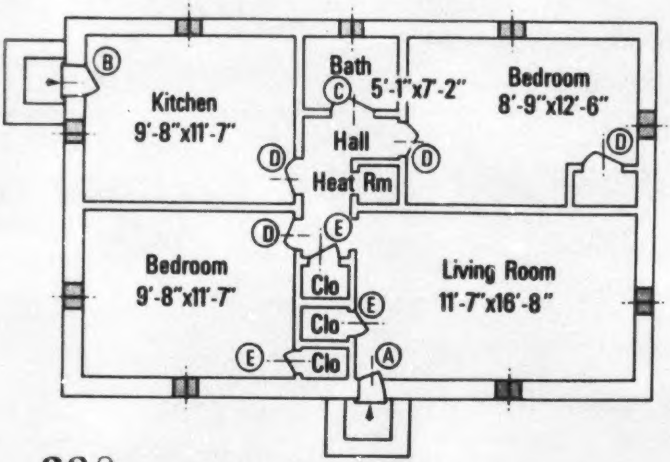
HIP ROOF



SIDE AND END VIEWS OF A FARM STRUCTURE

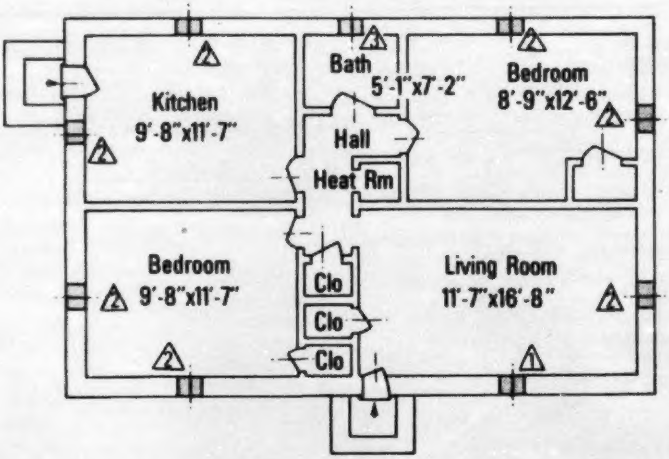
Door Schedule

Symbol	Width	Height	Thickness	Material	Type	Screen	Quantity	Threshold	Finish	Manufacturer
Ⓐ	3'-0"	6'-8"	1 3/4"	Ash	Solid	Aluminum Self-Storing Storm Door	1	Aluminum	Ext. Varnish	Ace Door Co.
Ⓑ	2'-8"	6'-8"	1 3/4"	Ash	Slab Core		1	Aluminum	Ext. Varnish	Ace Door Co.
Ⓒ	2'-6"	6'-8"	1 3/8"	Ash	Hollow Core	No	1	No	Int. Varnish	"
Ⓓ	2'-8"	6'-8"	1 3/8"	Ash	Hollow Core	No	4	No	Int. Varnish	"
Ⓔ	2'-4"	6'-8"	1 3/8"	Ash	Hollow Core	No	3	No	Int. Varnish	"

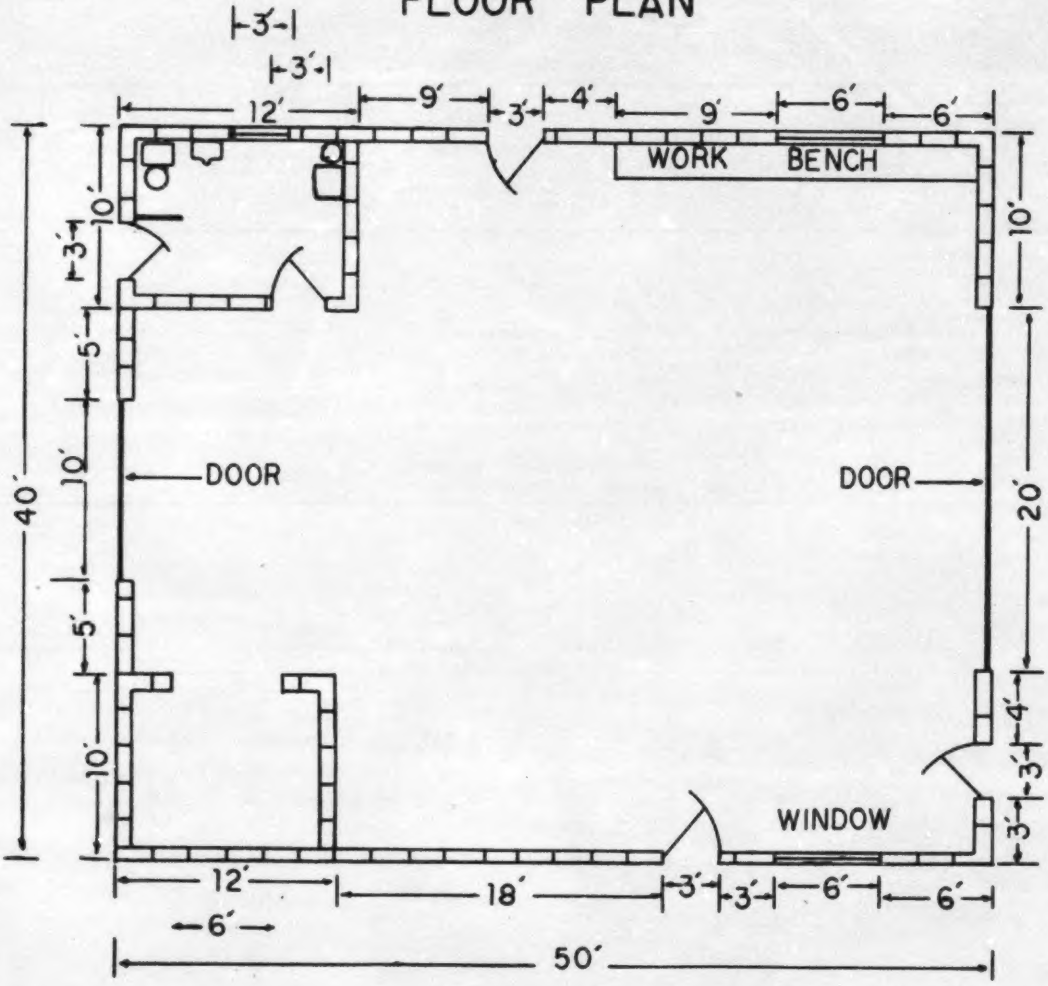

Ⓑ
Kitchen
9'-8"x11'-7"
Bath
Ⓒ
5'-1"x7'-2"
Bedroom
8'-9"x12'-6"
Hall
Ⓓ
Ⓓ
Ⓓ
Heat Rm
Ⓓ
Ⓔ
Bedroom
9'-8"x11'-7"
Clo
Clo
Ⓔ
Living Room
11'-7"x16'-8"
Ⓔ
Clo
Ⓐ

Window Schedule

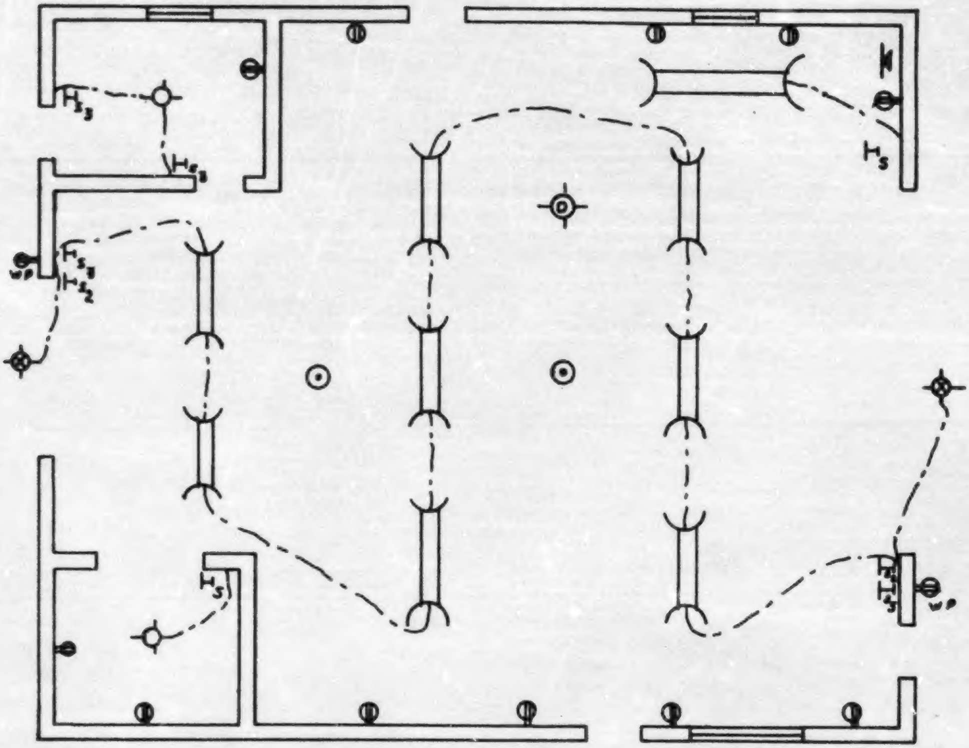
Symbol	Width	Height	Material	Type	Screen	Quantity	Remarks	Manufacturer	Catalog #
△1	5'-0"	4'-0"	Aluminum	Stationary	No	1		A&S Glass	54BW
△2	4'-0"	4'-0"	"	Double Hung	Yes	7		A&S Glass	44DW
△3	3'-0"	3'-0"	"	"	"	1	Frosted Glass	A&S Glass	33DW


Kitchen
9'-8"x11'-7"
Bath
5'-1"x7'-2"
Bedroom
8'-9"x12'-6"
Hall
Heat Rm
Bedroom
9'-8"x11'-7"
Clo
Clo
Clo
Living Room
11'-7"x16'-8"
2
2
3
2
2
2
2
2
1

FLOOR PLAN

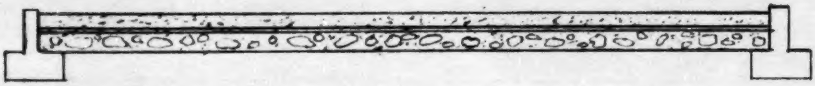

3′
3′
12′
9′
3′
4′
9′
6′
6′
WORK
BENCH
10′
3′
5′
10′
DOOR
DOOR
10′
20′
40′
5′
10′
4′
3′
3′
WINDOW
12′
18′
3′
3′
6′
6′
6′
50′

ELECTRICAL PLAN

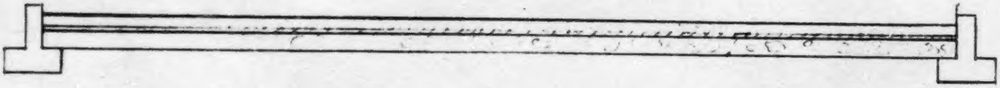

S_3
S_3
S_3
S_2
WP
D
S
S
S
S
WP

FOUNDATION

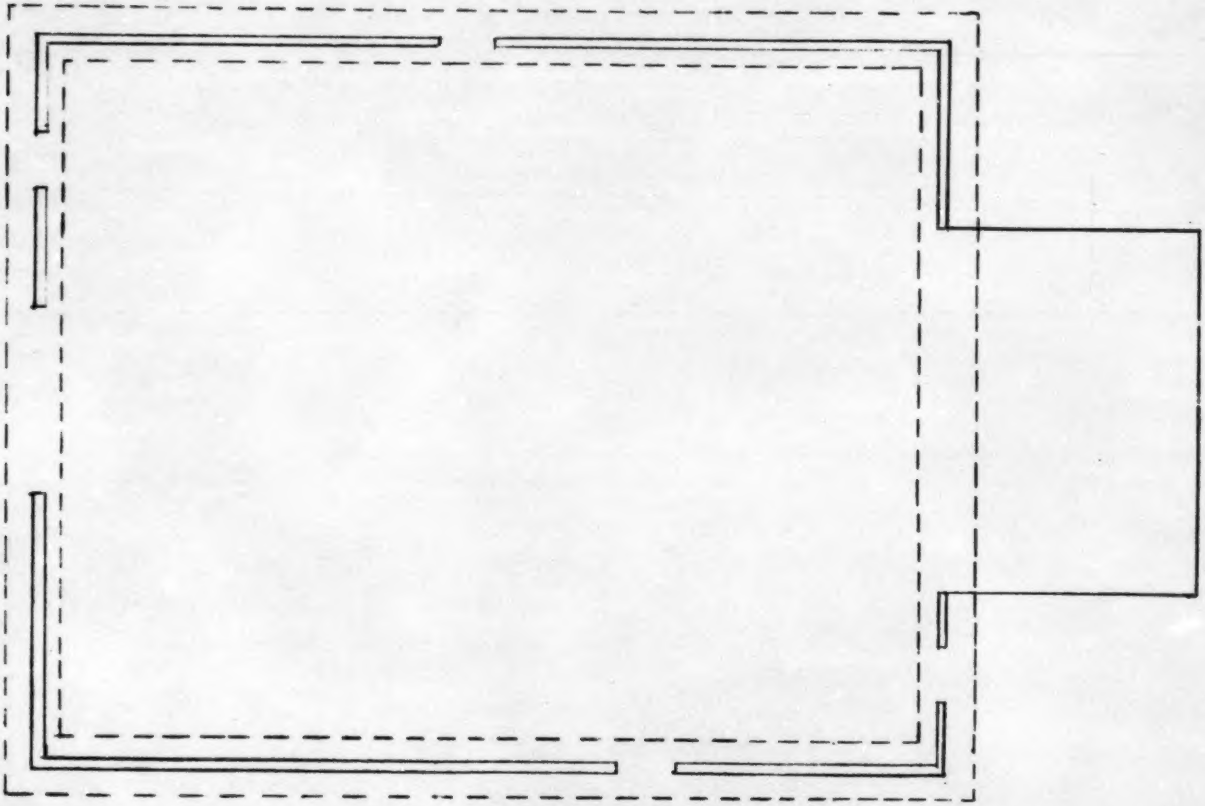
WIDTH



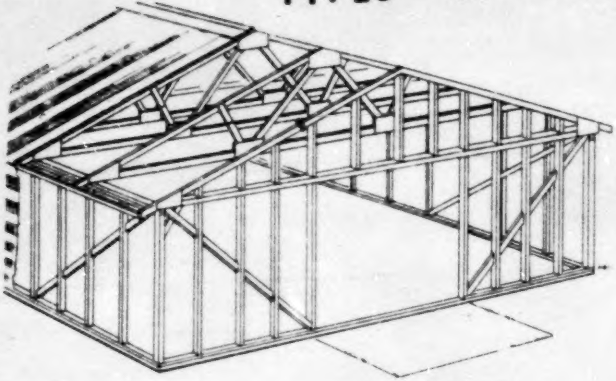
LENGTH



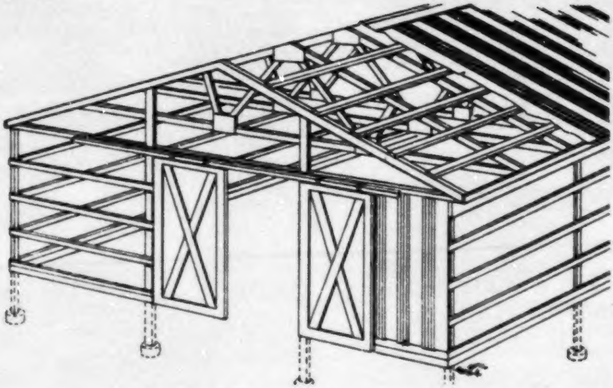
FOUNDATION



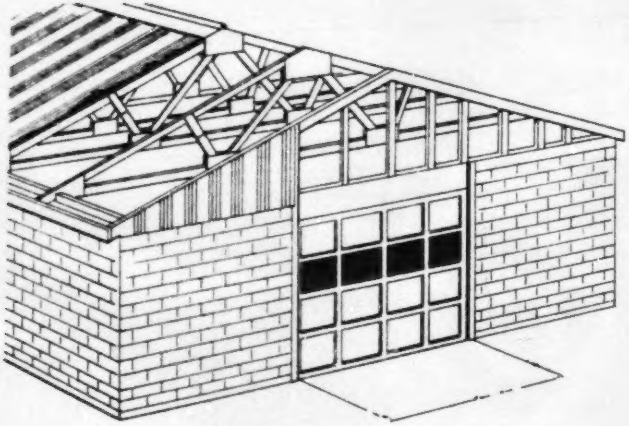
TYPES OF CONSTRUCTION



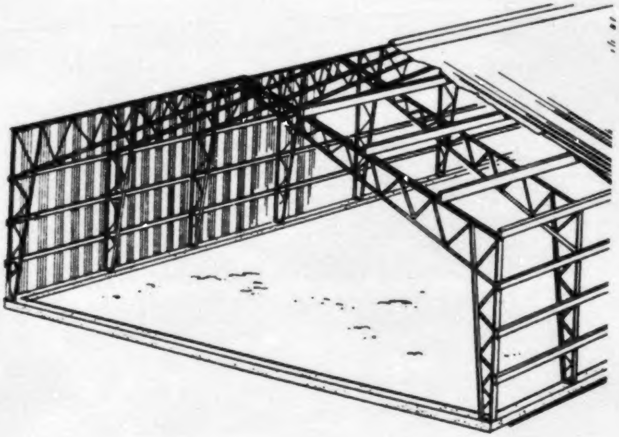
a. Stud frame construction



b. Pole frame construction



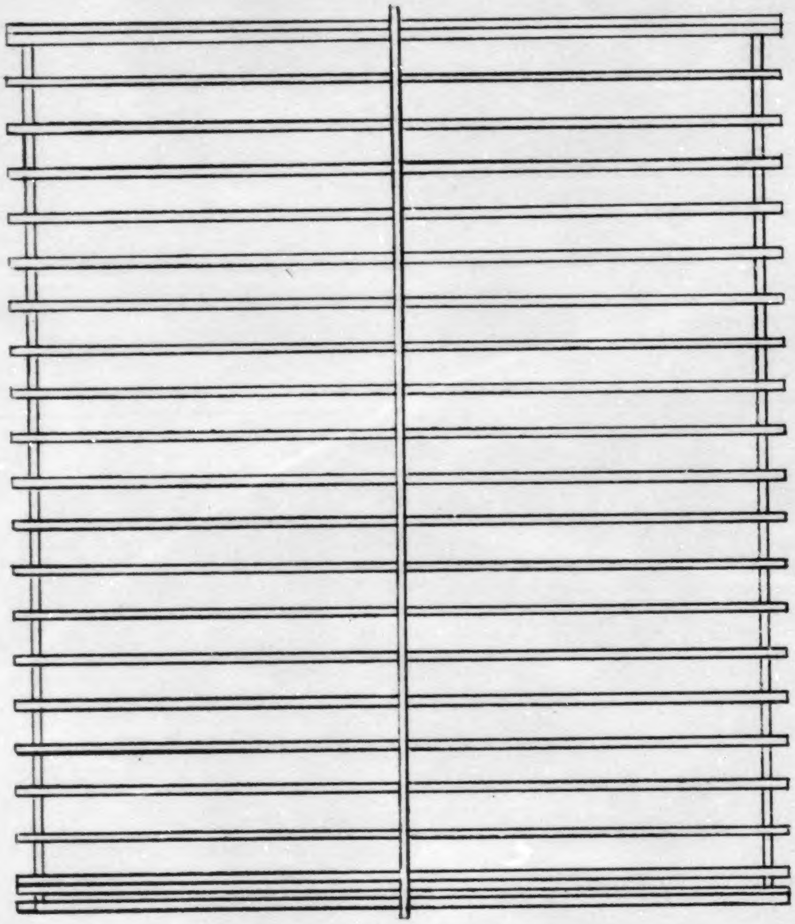
c. Concrete masonry construction



d. Rigid arch construction

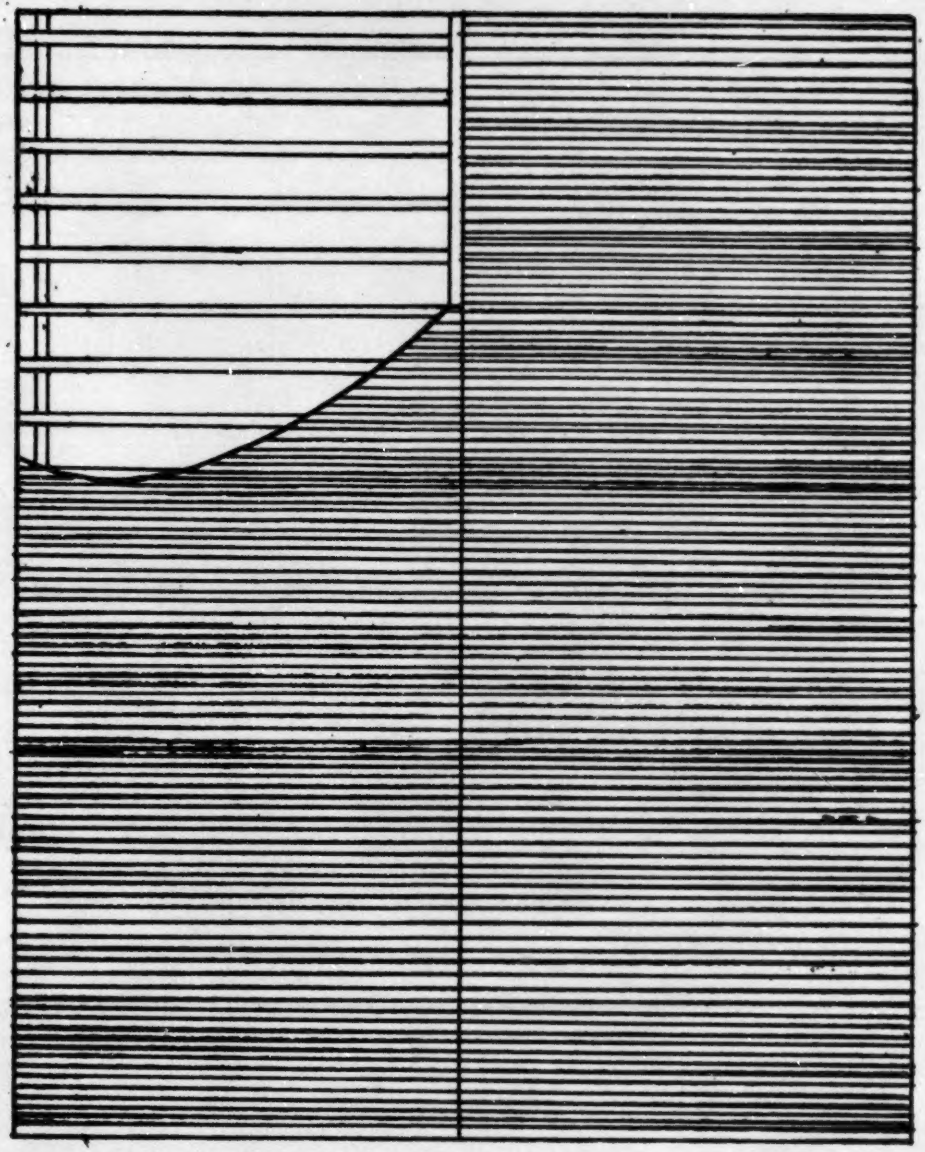
STRUCTURE

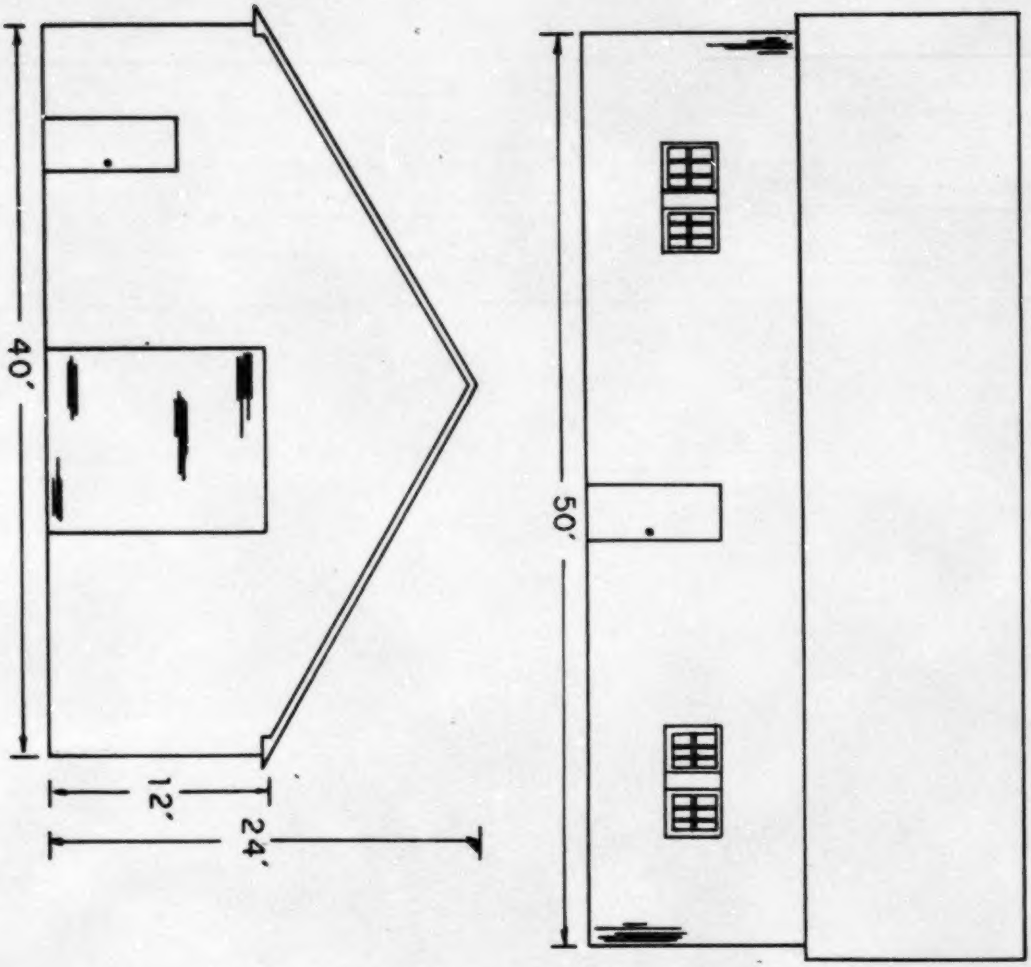
(Top View)



STRUCTURE

(Roof)





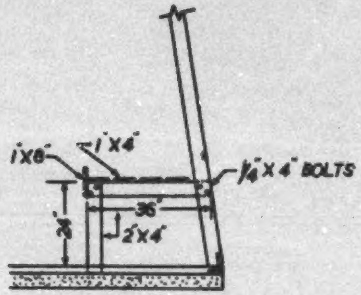
SIDE AND END VIEWS OF A FARM STRUCTURE

DESIGNING FARM BUILDINGS

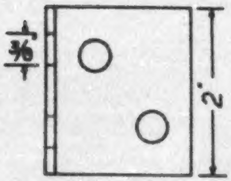
ASSIGNMENT SHEET #1 - DRAWING A GREENHOUSE

Instruction: Draw to the best of your ability the greenhouse shown on the next page. Paper will be provided to you by the instructor. Use a scale of ¼" = 1'. Upon completion turn in to instructor for evaluation.

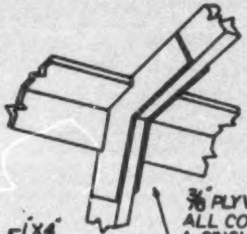
NOTE: COVERING MAY BE CLEAR CORRUGATED FIBERGLASS OR VINYL PLASTIC


1"X6"
1"X4"
¼"X 4" BOLTS
36"
24"
2"X4"

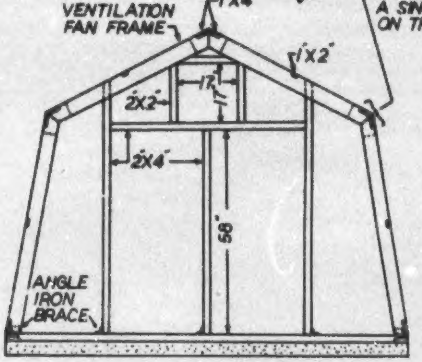
BENCH SUPPORT



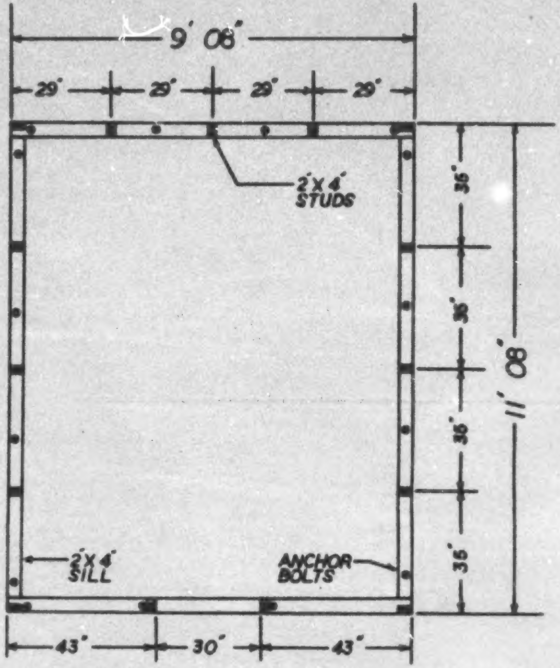
ANGLE IRON BRACE



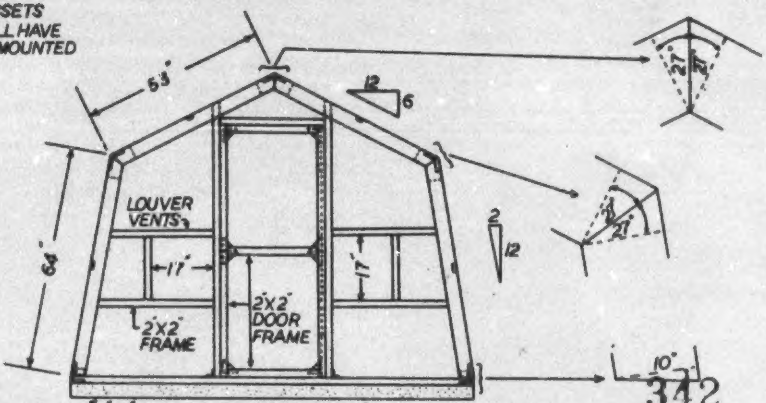
3/8" PLYWOOD GUSSETS ALL CORNERS WILL HAVE A SINGLE GUSSET MOUNTED ON THE INSIDE


VENTILATION FAN FRAME
1"X4"
1"X2"
17"
2"X2"
2"X4"
58"
ANGLE IRON BRACE

BACK VIEW


9' 08"
29"
29"
29"
29"
2"X4" STUDS
35"
35"
35"
35"
11' 08"
2"X4" SILL
ANCHOR BOLTS
43"
30"
43"

PLAN VIEW


53"
12
6
27°
27°
64"
LOUVER VENTS
17"
17"
2"X2" FRAME
2"X2" DOOR FRAME
21°
21°
2
12
10"

2-4"X8" CONCRETE BLOCKS OR 4" CONCRETE FOUNDATION

FRONT VIEW

DESIGNING FARM BUILDINGS

ASSIGNMENT SHEET #2 - DESIGNING AND DRAWING A FARM BUILDING

Instructions: Design a farm structure of your choice. Submit a rough draft to your instructor for approval. The following views should be included.

1. Floor plan
2. Foundation
3. Electrical
4. Structural
5. Top
6. Side and end

Upon completion submit all six drawings to the instructor.

DESIGNING FARM BUILDINGS

ANSWERS TO ASSIGNMENT SHEETS

Assignment sheet #1

To be completed to the satisfaction of the instructor.

Assignment sheet #2

All six drawings are to be completed to the satisfaction of the instructor.

DESIGNING FARM BUILDINGS

TEST

I. Match terms associated with structural design to the correct definition.

___A. A detailed plan or proposal for something.

___B. A photographic print in white on a bright blue ground used in drawing and architects plans.

___C. Weight placed on a structure from more than one load at any one time.

___D. The upper covering of a building.

___E. Weight of wind action such as tornadoes.

___F. Materials used to retain or repel heat or cold.

___G. Weight of ice, snow and water accumulated in an undrifted condition on flat exposed ground surfaces.

___H. Ability to use space available to the maximum potential.

___I. Weight of all materials used in the building construction such as floors, roof, etc.

1. Roof
2. Insulation
3. Space Utilization
4. Dead Loads
5. Snow and Ice Loads
6. Wind Loads
7. Combination Load
8. Specification
9. Blueprint

II. List seven factors to consider when designing floors.

A.

B.

C.

D.

E.

F.

G.

III. List rules necessary in designing a wall.

A.

B.

C.

D.

E.

F.

IV. List factors to consider when designing a roof.

A.

1.

2.

3.

4.

5.

6.

B.

1.

2.

3.

4.

5.

6.

C.

1.

2.

3.

4.

D.

E.

V. Name ten types of insulation.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

VI. List rules to be concerned with as to space utilization in designing farm structures.

A.

B.

C.

D.

E.

F.

G.

H.

VII. Name ten specifications found on door schedule.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

VIII. Name nine specifications found on window schedule.

A.

B.

C.

D.

E.

F.

G.

H.

I.

IX. Discuss in writing blueprint.

A.

B.

1.

2.

3.

4.

5.

6.

C.

1.

2.

3.

4.

5.

6.

X. Name drawings that should be included in a major farm building.

A.

1.

2.

3.

4.

5.

B.

1.

2.

3.

C.

1.

2.

3.

D.

1.

2.

E.

1.

2.

3.

DESIGNING FARM BUILDINGS

ANSWERS TO TEST

I. A. 8
   B. 9
   C. 7
   D. 1
   E. 6
   F. 2
   G. 5
   H. 3
   I. 4

II. A. Footing and foundation
    B. Quality of materials
    C. Strength of materials
    D. Weight on floor
    E. Wear on floor
    F. Life of floor
    G. Cost

III. A. Specifications
     B. Quality of materials
     C. Strength of materials
     D. Insulation
     E. Plumbing, heating, wiring outlets
     F. Cost

IV. A. Style
    1. Lean-to
    2. Flat

- 3. Gambral
- 4. Gable
- 5. Mansard
- 6. Hip

B. Material

- 1. Wood shingles
- 2. Asphalt
- 3. Galvanized iron
- 4. Metal
- 5. Fiberglass
- 6. Aluminum

C. Load Strength

- 1. Dead
- 2. Snow and Ice
- 3. Wind
- 4. Combination

D. Specification

E. Cost

V. A. Loose fill

B. Blanket

C. Batt

D. Rigid

E. Slab

F. Reflective

G. Native materials

H. Vapor Barriers

I. Blow in

J. Foam

VI. A. Reduce hallways
- B. Make proper use of all available space.
- C. Organize building
- D. Avoid unnecessary luxuries
- E. Buildings should be designed in a way that will allow the structures to be used for many jobs, events, activities, etc.
- F. Equiped with easily set up and stored equipment.
- G. Safe
- H. Economical

VII. A. Width
- B. Length
- C. Thickness
- D. Materials
- E. Type
- F. Screen
- G. Quantity
- H. Threshold
- I. Finish
- J. Manufacturer

VIII. A. Width
- B. Height
- C. Materials
- D. Type
- E. Screen
- F. Quantity
- G. Remarks
- H. Manufacturer
- I. Catalog

IX. A. Used as the last source in determining how to construct a structure.

B. Drawings:

1. Floor plan
2. Foundation plan
3. Structural plan
4. Top view
5. Side view
6. End view

C. Symbols

1. Electrical
2. Plumbing
3. Heating
4. Materials
5. Doors
6. Windows

X. A. Floor plan

1. Walls
2. Plumbing
3. Windows
4. Doors
5. Specifications

B. Electrical

1. Outlets
2. Wire
3. Heat and cooling

C. Foundation

1. Footings

  2. Slabs
  3. Specifications
- D. Structural
  1. Frameworks
  2. Specifications
- E. Top views
  1. Structural
  2. Roof
  3. Specifications
- F. Side and end views
  1. Outside view of buildings
  2. Specifications